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FORTIFICATIONS, BRIDGES, AQUEDUCTS, TUNNELS,
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BARRACKS, WAREHOUSES,
ETC. ETC. ETC.

WITH SPECIFICATIONS FOR PERMANENT WAY,
FOR TELEGRAPH MATERIALS, AND FOR WORKS, PLANT, MAINTENANCE,
AND WORKING OF A RAILWAY; AND AN ALPHABETICAL PRICED LIST OF MACHINERY,
PLANT, TOOLS, AND FITTINGS REQUIRED BY THE CONTRACTOR,
IN THE EXECUTION OF PUBLIC WORKS.

ILLUSTRATED WITH PLATES AND NUMEROUS WOODCUTS.

By W. DAVIS HASKOLL, C.E.,

Author of
"Railway Construction;" "The Engineer's, Mining Surveyor's, and Contractor's Field-Book;"
"The Practice of Engineering Field Work;" "Land and Marine Surveying," &c. &c.

BIBLIOTHECA · BODLEIANA ·

In Two Parts.

PART I.
Prices, Estimates, Specifications, etc.

PART II.
Priced List of Contractor's Machinery, Plant, Tools, and Fittings.

LONDON:
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PREFACE.

THE preparation of estimates for tenders for Public Works is one of the most important duties of the Engineer; involving great responsibility and anxiety, which sometimes have to be endured for years after the tenders have been put in, or until the works are completed, and the Chief Engineer's "final certificate" obtained. There is no duty in which professional reputation is more directly concerned or more keenly affected, for if, at an Engineer's recommendation, too high a tender has been offered, he may lie open to the reproach of having caused the loss of a profitable undertaking; if too low, he is liable to the still more dangerous odium of causing his clients to lose large sums of money; there are, indeed, very few duties which require greater consideration of almost innumerable subjects and conditions, varying with localities and circumstances, all of which affect labour and materials.

These considerations have induced the writer to prepare the following pages for the use of both Engineer and Contractor. Even in the hands of those having some experience, it is hoped they may often serve to call attention to matters which in the haste of estimating might otherwise be forgotten. If there could be any doubt as to the accuracy of the above observations, it would clearly be removed by the simple fact of the immense differences which occur almost daily between tenders put in for the same works, even by men of well-known experience; this often occurs in a very simple manner, and merely by losing sight momentarily of some minor conditions which repeat themselves throughout a line of works, or perhaps some single circumstance bearing heavily on some important construction: an examination of the following pages will explain how this may occur.

There must, however, always be one important ingredient in these matters, and this will be the value of labour, not only as regards cost or wages, and the consideration obtained in the shape of work, but also the amount of labour to be readily obtained, or the cost of importing labour, and then, sometimes, that of retaining it after importation. The first case will, of course, cheapen work, whilst either of the latter will enhance its value; this, on extensive works, becomes of primary importance, and requires to be very closely examined into before it is possible to shape a reliable estimate; careful local inquiries, made by some means or other, can alone yield satisfaction on this point, and enable us to add or deduct from an ordinary schedule.

On heavy engineering works, the Contractor's plant will always be a matter of great importance, to himself at least, and it is one which might always be considered with advantage to all parties; a second part to the work has therefore been added, bearing entirely on this subject, and which the Publishers have very liberally added, although not contemplated when notice of the work was first issued. On the subject of discount see the Preface to the Second Part.

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Table I.—*continued.*

Prices for Earthworks, Excavator's Work, &c.

Earthworks.

	Light earths, as peat or cotton soils, dry sands, fine gravels, or light loams.		Clay, shale, coarse heavy gravel, chalk, hard marls, &c.		Rock not requiring powder.		Hard rock requiring to be blasted.	
	s.	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*
4. Excavating, &c., in road diversions, carting and depositing, lead not exceeding 220 yards per cubic yard	0	8	0	11	1	5	2	4

***Fig.* 1.**

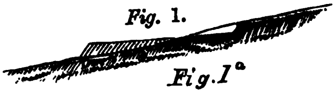


***Fig.* 1ª**

***Fig.* 2.**

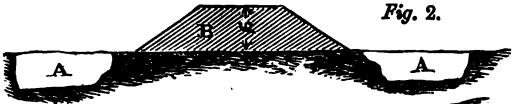


***Fig.* 2ª**

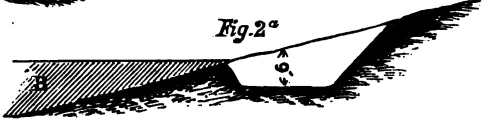
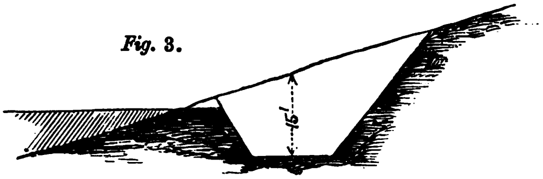


***Fig.* 3.**



	s.	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*
5. Excavating for stream diversions, not exceeding 3 feet in depth, where the ground is wet, and running to spoil per cubic yard	0	8	0	10	1	2	2	1
6. Ditto, for every foot extra in depth, add per cubic yard	0	1	0	2	0	4	0	5
7. Excavation in road approaches and carting to embankment per cubic yard	0	8	0	10	1	2	2	1

TABLE I.—*continued.*

Prices for Earthworks, Excavators' Work, &c.

EARTHWORKS.

	Light earths, as peat or cotton soils, dry sands, fine gravels, or light loams.		Clay, shale, coarse heavy gravel, chalk, hard marls, &c.		Rock not requiring powder.		Hard rock requiring to be blasted.	
	s.	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*
Excavating for road approaches in embankment, per cubic yard	0	6	0	10	1	1	0	2
8. Excavating in cuttings and tipping into embankments, &c., lead not exceeding ¼ mile, or run to spoil on short lead if land has to be obtained for spoil bank, as in fig. 3 ....per cubic yard	0	8	0	10	1	2	2	1
9. If lifted beyond 15 feet, and run to spoil, for every additional 5-ft. lift, &c....add per cubic yd.	0	2	0	3	0	4	0	4
10. Excavating in foundations and carting to embankment, including shoring if necessary, as for road bridges, or piers of viaducts (dry), not exceeding 6 feet deep ......per cubic yard	0	9	1	0	1	3	2	2
11. Ditto, ditto, not exceeding 12 feet deep.........per cubic yard	1	1	1	5	1	9	2	7
12. Ditto, ditto, not exceeding 18 feet deep..........per cubic yard	1	6	1	10	1	11	2	10
For Items 1 to 9, in case of canal or other works, where any considerable quantities of water, may have to be drained off, or pumped ...add per cubic yard	0	2	0	2	0	3	0	6
For Items 10 to 12, ditto, ditto, ditto, exclusive of any cofferdam work, add per cubic yard from	0	4	0	4	0	6	0	8
to	0	6	0	6	0	9	1	0
13. For carting away in any of the above items, including filling and depositing, not exceeding 220 yards...per cubic yard	0	7	0	8	0	9	0	10
Add for every additional furlong per cubic yard	0	1	0	1	0	1½	0	1½

TABLE I.—*continued.*

Prices for Earthworks, Excavators' Work, &c.

WELL-SINKING.

		s.	d.
14.	Sinking wells, 4′ 6″ in diameter in the clear, through sand, clay, gravel, including shoring and keeping out water, and labour only of dry rubble walling 16 inches thick, or dry brick work 9 inches thick, any depth not exceeding 20 feet........................per foot in depth	3	6
15.	Ditto, from 20 to 30 feet depth ... ditto	4	4
16.	Ditto, from 30 to 40 ditto ... ditto	5	6
17.	Ditto, from 40 to 50 ditto ... ditto	6	10
18.	Ditto, from 50 to 60 ditto ... ditto	8	4

19. Sinking wells through hard marls, or earth mixed with boulders, for any item from 14 to 18, multiply the above prices by 1¾; through rock, not requiring blasting, at from 2 to 2½, the above prices, according to walling required.

20. Through rock requiring blasting, at four times the above prices.

In this description of work, no two cases will be exactly alike; the cost will vary with the quantities of water tapped in sinking, with the sound or slippy nature of the materials sunk through, and with their hardness, or the comparative facility with which they are pierced. Some of the sandstones and the chalks are less troublesome than some of the tertiary formations, if in the latter we happen to meet with beds of large coarse gravel, or clay and silt.

The average cost of borings in tertiary strata, the diameter of the bore being about 10 inches, may be taken at—

	s.	d.			
	5	0	per foot up to	100	feet deep.
	8	0	,,	200	,,
8-inch bore	14	0	,,	300	,,
	30	0	,,	400	,,

To the above will have to be added, when the nature of the boring requires it, the cost of cast-iron piping, about 8 in. diameter and $\frac{5}{8}$ in. thick, with turned joints and screw fitted, and which may come to about 10*s*. 6*d*. per yard lineal; and the cost will not be any less for the

TABLE I.—*continued.*

Prices for Earthworks, Excavators' Work, &c.

WELL-SINKING—PUDDLING.

smaller diameter of pipe, on account of the increased depth. Perforated copper pipes, weighing 7 lbs. to the foot, have been inserted in deep chalk borings, at 12*s.* per foot lineal.

The cost, including all contingencies, of a 6-inch bore at the bottom of a well, 185 feet deep, at Liverpool, was—

		£	s.	
For the	1st 20 yards . . .	2	10	per yard
„	2nd „ . .	3	0	„
„	3rd „ . .	3	10	„
„	4th „ . .	4	0	„
„	5th „ . .	4	10	„

Borings in chalk, 1000 feet deep, may cost from 2000*l.* to 3000*l.*, all included.

The well sunk at Messrs. Reid and Co.'s brewery, through 83 yards of tertiary and chalk formations, cost 7454*l.*, or a little more than 86*l.* per yard; this includes cost for 48 feet of cast-iron cylinder 5 feet 3″ × 3 feet 2″, which was sunk down to the depth of 135 feet, or within 1½ foot of the chalk flints. From the depth of 178 down to 202 feet, the well is 16½ feet in diameter; it includes also about 110 lineal yards of headings, 6 feet × 5 feet, driven at various depths, and also a shaft of 7 feet diameter sunk 22 feet lower than the 202 above mentioned.

	s.	*d.*
21. Forming puddle-walls at the back of masonry and brickwork, labour and water only ...... per cubic yard	0	10
22. Ditto, ditto, for reservoirs, labour and water only per cubic yard	1	3
23. Superior stiff clay for puddling, free from sand, stone, weed, and in all respects clear of all extranous matter, delivered on the work............at per cubic yard, from	2	0
to	4	0

TABLE I.—*continued.*

Prices for Earthworks, Excavators' Work, &c.

DITCHING, BALLSTING, METALLING, DRAIN-PIPES, &c.

		s.	d.
24. Ditching and forming, for railways, roads, canals, &c.	per lineal yard	0	4
25. Quicking for ditto, ditto, 12 young healthy plants	per lineal yard	0	2
26. Trimming and soiling	per super yard	0	2½
27. Ballasting, labour only	per cubic yard	1	3
28. Forming permanent way, including ballasting, single line	per lineal yard	6	0
29. Forming permanent way, including ballasting, double line	per lineal yard	10	9
30. Forming permanent way, single line	„ „	1	0
31. Ditto double line	„ „	1	6
32. Metalling 18 inches thick, and forming ground for same	per super yard	3	0
33. Metalling 12 inches thick, and forming ground for same	per super yard	2	3
34. Metalling, 9 inches thick, and forming ground for same	per super yard	1	9
35. Drain pipes, glazed stone ware, 18 inches diameter, surface of pipes laid 2 feet below surface of ground	per lineal yard	14	0
36. Ditto, 15 inches diameter, surface of pipes laid 2 feet below surface of ground	per lineal yard	9	3
37. Ditto, 12 inches diameter, surface of pipes laid 2 feet below surface of ground	per lineal yard	6	0
38. Ditto, 9 inches diameter, surface of pipes laid 2 feet below surface of ground	per lineal yard	4	0
39. Ditto, 6 inches diameter, surface of pipes laid 2 feet below surface of ground	per lineal yard	2	8
40. Bends and elbows to glazed stoneware drain pipes, 18 inches	each	11	0
41. Ditto ditto ditto 15 inches	„	7	6
42. Ditto ditto ditto 12 „	„	5	6
43. Ditto ditto ditto 9 „	„	3	3
44. Ditto ditto ditto 6 „	„	2	3

TABLE I.—*continued.*

Prices for Earthworks, Excavators' Work, &c.

LANDINGS IN FOUNDATIONS, &c.

Self-faced or roughly scabbled joints squared throughout, brought to a parallel thickness, laid in cement:—

	A.* s. d.	B. s. d.	C. s. d.	D. s. d.
45. 4 inches thick, and not exceeding 3 yards super area per super yard	19 6	14 3	12 9	12 9
46. 5 inches, ditto, ditto „	23 3	16 6	15 0	19 6
47. 6 inches, ditto, ditto „	27 9	20 0	...	24 0
48. 7 inches, ditto, ditto „	30 0	24 0	...	28 6
49. 4 inches thick, exceeding 3 yards super area and not exceeding 5 yards......per super yard	24 9	18 3	16 3	16 3
50. 5 inches ditto, ditto „	28 9	20 3	18 3	19 6
51. 6 inches ditto, ditto „	33 0	24 0	...	24 0
52. 7 inches ditto, ditto „	35 3	28 6	...	28 6
53. Joggle joints run in cement add per foot run	1 6	1 6	1 3	1 3

	£	s.	d.
54. *a* Concrete, six parts of gravel (gravel excavated on the works) and one part of lime ......per cubic yard	0	5	8
55. Ditto, ditto, if the gravel has to be purchased in the neighbourhood ....per cubic yard	0	7	9
56. Ditto, ditto, if the gravel has to be purchased and brought from a distance ....per cubic yard	0	10	6
57. *b* Cement concrete, per cubic yard from 8*s.* 0*d.* to	0	14	0
58. Cement concrete blocks...............per cubic yard	0	9	0

Cofferdams, Constructing, Maintaining, and Removing.

		£	s.	d.
59. Fifteen feet deep from bed............	per foot run	2	10	0
60. Eighteen ditto, ditto	„	3	0	0
61. Twenty ditto, ditto	„	3	11	0
62. Twenty-two ditto, ditto	„	4	4	0
63. Twenty-four ditto, ditto	„	5	1	0
64. Twenty-six ditto, ditto	„	6	4	0
65. Twenty-eight ditto, ditto	„	7	18	0
66. Thirty ditto, ditto........	„	10	6	0

a As regards the price of concrete, with gravel excavated on the works, it is always very important

---

* A, granite; B, hard limestone, or hard fine sandstone; C, slate; D, suitable local stone, or stone of inferior value from the neighbourhood, though adapted for landings.

TABLE I.—*continued.*

Prices for Earthworks, Excavators' Work, &c.

ROAD-MAKING, PAVING, &c.

for a contractor to ascertain the description of gravel he will find; it may be so coarse that every stone will have to be broken and sand added, which will add considerably to the expenses of Item 54, or the gravel may all require screening, which also will be an additional expense; where concrete is to be used in large quantities, as in docks, lined reservoirs, heavy viaducts, &c., it is necessary to obtain as much information as possible, on the subject of the gravel to be obtained, if the estimate is to be trusted.

b As regards Item 57, the above observations are equally important, and much also depends on any particular specification as to the nature of the cement to be used.

	s.	*d.*
67. Macadamized road, 6 inches thick, stones to pass through a ring of 1½ inch in diameter, including spreading and levelling .... per super yard	0	9
68. Ditto, 4 inches thick, ditto, ditto, ditto „	0	6
69. Ditto, 3 inches thick, ditto, ditto, ditto „	0	4½
70. Spreading broken stone or gravel in repairs of roads, and levelling the same .... per cubic yard	0	7
71. Breaking stone for road making, to pass through a ring of 1½ inch in diameter, labour only per cubic yard	2	0
72. Ditto, ditto, labour and materials...... „	4	0
73. Picking up old roads, for metalling or macadamizing, about 2 inches thick .... per square yard	0	0¾
74. Concrete foundations for paving, including spreading and levelling .... per cubic yard	6	3
75. Paving with Aberdeen pitchers, or other granite of equal quality, squared on face, and of parallel joints for at least one half of the depth, laid in courses 4 to 5 inches wide, 6 inches deep, including forming the ground .... per super yard	9	0
76. Taking up and relaying ditto........... „	0	9
77. Paving as above, with granite pitchers, as above, 7 inches deep .... per super yard	10	6

TABLE I.—*continued.*

Prices for Earthworks, Excavators' Work, &c.

ROAD-MAKING, PAVING, FLAG AND RUBBLE DRAINS.

	s.	d.
78. Taking up and relaying ditto .... per super yard	0	10
79. Paving with granite pitchers, as above, 3 inches wide and 5 inches deep.......................... per super yard	10	0
80. Paving with limestone pitchers, squared on face, and of parallel joints for at least half the depth, laid in courses from 4 to 5 inches wide, 6 inches deep, including forming the ground .... per super yard	4	9
81. Taking up and relaying ditto .... "	0	9
82. Paving with limestone pitchers, squared on face and of parallel joint for at least one-half the depth, laid in courses from 4 to 5 inches wide, 7 inches deep per square yard	5	6
83. Taking up and relaying ditto, ditto "	0	10
84. Paving with limestone pitchers, as above, 9 inches deep .... per square yard	10	0
85. Paving with hard round pebbles, not less than 3½ inches diameter, and selected of uniform size, and bedded endways.......................... per super yard	1	4
86. Taking up and relaying ditto, ditto "	0	7
87. Add to any of the above, if grouted with hot lime per square yard	0	2
88. To any of the above laid in mortar and grouted, add per super yard	0	9
89. Flag and rubble drains, 2 feet by 2 feet 6 inches opening, with 2 inch flags (fig. 4), per yard lineal	21	0
90. Ditto, ditto, 3 feet by 3 feet 9 inches opening, with 2½ inch flags (fig. 5) per yard lineal	31	6

Fig. 4.

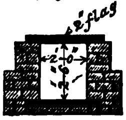


Fig. 5.

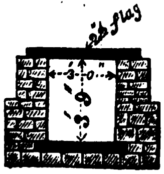
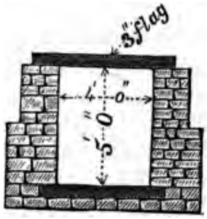


TABLE I.—*continued.*

Prices for Earthworks, Excavators' Work, &c.

SUNDRIES—FENCING AND GATES.

Fig. 6.



	s.	d.
91. Flag and rubble drains, 4 feet by 5 feet opening, with 3 inch flags (fig. 6) per yard lineal......	53	0
92. Picked pebbles, not less than 3 inches in diameter, selected of uniform size, hard, and sound......per ton	4	6
93. Limestone pitchers, 3 inches on the face, parallel joints not less than half the depth, and 5 inches deep per ton	19	0
94. Ditto, not exceeding 5 inches on the face, parallel joints for at least half the depth, 6 inches deep, per ton	13	0
95. Ditto, ditto, ditto, 7 inches deep........... „	12	0
96. Sand, road or river, free from loam...per cubic yard	3	0
97. Ditto, selected, sharp and clean, washed for cement work ....per cubic yard	4	0
98. Gravel, clean but unscreened, fit for ballasting or metalling .... per cubic yard	3	0
99. Ditto, screened to any size required „	4	0
100. Ditto, quite free from loam and fit for concrete per cubic yard	3	6
101. Quarry or paving tiles, 9 inches...............per 100	10	0
102. Carting 1000 of bricks........................per mile	3	6
103. Three-rail post and rail fence.........per lineal yard	1	6
104. Four-rail, ditto, ditto .... „	1	8
105. Arris-rail fence to approaches, wrought and painted per lineal yard	6	6
106. Ditto, oak ditto .... „	7	9
107. Public-road gates, wrought and painted, including all iron-work, fixed complete .... each	110	0
108. Occupation-road gates, wrought and painted, including all iron-work, fixed complete .... each	60	0
109. Foot-path gates, wrought and painted, fixed all complete ....each	30	0
110. Inclination and parish boundary posts, painted, fixed complete ....each	7	6

TABLE I.—*continued.*

Prices for Earthworks, Excavators' Work, &c.

COVERED RESERVOIRS AND FILTERING BEDS.

		s.	*d.*
111.	Mile posts and ¼-mile posts, painted, fixed complete ... each	5	0
112.	Creosoted planking in foundations, 4 inches thick per super foot	1	3
113.	Creosoting timber, 10 lbs. per cubic foot per cubic foot	1	0

Cost of covered reservoirs and of filtering beds, exclusive of land; the cost of covered reservoirs with brick arches and brick piers and cross walls, may be taken at from 1*l.* 15*s.* to 2*l.* 10*s.* per thousand gallons of capacity.

The cost of filtering beds will vary from 1*l.* to 1*l.* 10*s.* per square yard, according to the cost price of sand, shells, and of the perforated tubular pipes laid under the filtering material.

COST OF LAND DRAINAGE.

EXAMPLES IN MR. J. PARKES' PRACTICE.

Area in Acres.	Description of Soil.	Depth of Drain below surface.	Distances between Drains.	Cost of Labour.			Cost of Tiles.			Total Cost.			Cost per Acre.		
			Yards.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.
33	Heavy clay	4 feet all.	12	113	8	5	37	16	3	151	8	4	4	11	7
61	Various clays		12	152	11	0	77	12	8	230	3	8	3	15	5
16	Strong clay		10 to 1	46	18	3	20	6	9	67	7	9	4	4	2
16	Strong sand		13	60	15	7	15	4	2	76	9	9	4	15	7
20	Weak blue clay		10	68	16	8	25	2	6	93	19	2	4	13	11
46	Whitish clay		12	165	4	5	55	15	6	220	19	11	4	16	1
13	Strong clay and gravel		11 to 12	49	8	7	17	15	6	67	4	1	5	3	4
12	Whitish clay		12	36	12	7	14	3	9	50	16	4	4	4	8
217										958	9	0	4	8	9

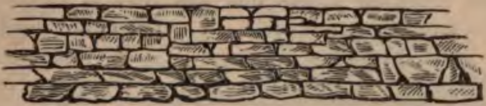
TABLE II.

Prices for Masonry, Rubble (coursed and uncoursed), Block-in-course, Coping, Labour on Stone Dressing, Steps, Sills, Curbs, Raking-out and Pointing, Culverts and Sewers, Brickwork in ditto per yard and per mile, Brickwork and Masonry Conduits and Cast Iron Pipes, Weight and laying and jointing Cast Iron Pipes, Discharge of ditto, Engine Power, Covered Reservoirs and Filtering-beds, Land-drainage, Flagging and Paving, Slate.

£ *s.* *d.*

1. Rubble masonry in blue lias mortar, built in courses, with sufficient through heading bond stones, not less than 1 foot long, no course to be less than 3 inches deep (fig 7) ....per cubic yard 0 9 0

Fig. 7.



2. Rubble masonry in blue lias mortar, built in horizontal courses, stone averaging 1½ foot × 12 inches × 9 inches deep, or four courses measuring not less than 3 feet deep, with sufficient through heading bond stones not less than 2 feet long (fig. 8) per cubic yard 0 11 6

Fig. 8.

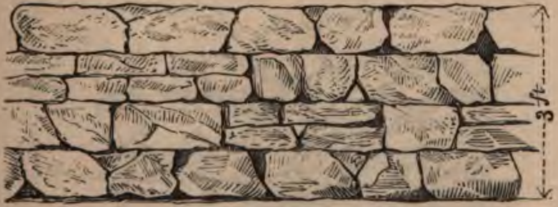
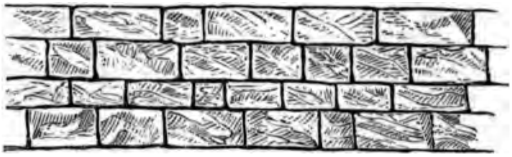


TABLE II.—*Continued.*

Prices for Masonry.

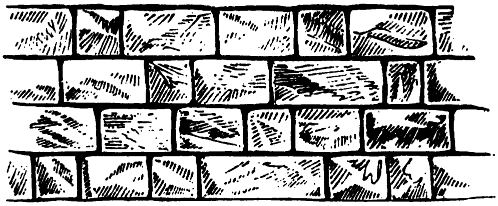
	£	s.	d.
3. Rubble masonry in blue lias mortar, built in horizontal courses, and joints vertical and hammered square at least 3 inches from the face, with through bond stones, not more than 18 inches apart vertically, nor more than 4 feet apart horizontally fig. 9) .... per cubic yard	0	14	0

Fig. 9.



	£	s.	d.
4. Rubble masonry, in blue lias mortar, built in horizontal courses, stones averaging 1½ foot × 12 inches × 9 inches deep, joints vertical and hammered square at least 6 inches from the face, with sufficient through heading bond stones not less than 2 feet 6 inches long, nor more than 3—6 feet apart in every course, the whole breaking joints not less than 3 inches (fig. 10) ....per cubic yard	0	17	0

Fig. 10.



	£	s.	d.
5. Random rubble masonry in blue lias mortar	0	8	6

Fig. 11.

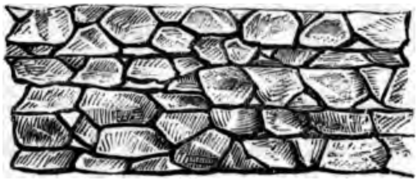


TABLE II.—*continued.*

Prices for Masonry, &c.

	£	*s.*	*d.*
6. Solid block-in-course masonry, in blue lias mortar, left quarry faced, stones not less than 8 inches thick, and not less than 18 inches × 12 inches on the bed, laid alternately, header and stretcher, one-fourth the length of each course to consist of through stones not less than 30 inches in length from the face, laid nearly equidistant, and so as to bond thoroughly into the work, beds and joints hammer-dressed true and square throughout, in work 3 feet thick and under, through stones to reach from face to face per cubic yard	2	5	0
7. Solid block-in-course masonry, in blue lias mortar, left quarry faced, with margin drafts 1 inch broad, in other respects same as last item ......per cubic yard	2	12	6
8. Solid block-in-course in arches, 2 feet deep and under, in blue lias mortar, with radiated joints, margin drafts 1 inch broad, and quarry faced per cubic yard	2	16	0
9. Block-in-course in blue lias mortar, backed with rubble, stone left quarry faced, block-in-course face being as in Item No. 6, and rubble of flat bedded stone, carefully built and filled in solid, brought to a level surface with every course of the face work, and well bonded into it, and every course of rubble well grouted per cubic yard	1	2	6
10. For Items 7, 8, and 9, with face rough punched and no margin drafts .... add per super yard	0	5	0
11. Ditto, ditto, ditto, with face fine punched and inch-wide margin drafts .... add per super yard	0	8	0
12. Ditto, ditto, ditto, with chiselled face add per super yard	0	12	6
13. Note.—For soft stones, *one-fourth* of prices set down for Items 10, 11, and 12, may be *deducted,* and for the hardest descriptions, *one-third* may be *added.*			
14. For Items 2, 4, 6, 7, 8, and 9, for Portland cement, one part of cement and two of sand, add per cub. yd.	0	3	6

Fig. 12.

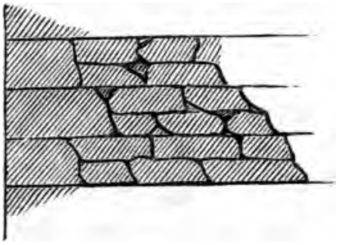
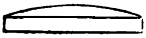
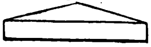
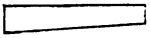
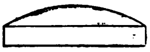
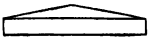
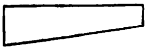


TABLE II.—*continued.*

	Prices for Masonry, &c.			*s.*	*d.*
15.	Ditto, ditto, if in Roman cement...add per cubic yard			2	6
16.	Ditto, ditto, ditto, if in Scott's hydraulic cement prepared from blue lias .... add per cubic yard			2	0
	Stone coping, set in cement, six inches deep at the apex, and in length not less than three feet:—				
17.	Fig. 13.—Three feet wide...per foot run			6	7
18.	„ Two ft. 6 in. wide	„ „	*Fig.* 13.	5	8
19.	„ Two feet wide	„ „		4	6
20.	„ One ft. 6 in. wide	„ „		3	6
21.	Fig. 14.—Three feet wide	„ „		5	10
22.	„ Two ft. 6 in. wide	„ „	*Fig.* 14.	5	0
23.	„ Two feet wide	„ „		4	0
24.	„ One ft. 6 in. wide	„ „		3	0
25.	Fig. 15.—Three feet wide	„ „		4	10
26.	„ Two ft. 6 in. wide	„ „	*Fig.* 15.	4	2
27.	„ Two feet wide	„ „		3	4
28.	„ One ft. 6 in. wide	„ „		2	7
	Coping set in cement, 9 inches deep at the apex, in length not less than 4 feet.				
29.	Fig. 16.—Three feet wide...per ft. run		*Fig.* 16.	8	6
30.	„ Two ft. 6 in. wide	„		7	3
31.	„ Two feet wide ...	„		6	0
32.	„ One ft. 6 in. deep	„		4	3
33.	Fig. 17.—Three feet wide...	„		7	6
33.	„ Two ft. 6 in. wdie	„	*Fig.* 17.	6	6
34.	„ Two feet wide ...	„		5	3
35.	„ One ft. 6 in. wide	„		3	9
36.	Fig. 18.—Three feet wide...	„		6	3
37.	„ Two ft. 6 in. wide	„	*Fig.* 18.	5	1
38.	„ Two feet wide ...	„		4	5
39.	„ One ft. 6 in. wide	„		3	2

	A.		B.		C.		D.	
	s.	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*
40. Stone in blocks, joints, and beds, fit for setting, per cubic ft.	2	2	1	8	1	2	0	11
41. Do., exceeding 20 ft. cubical contents......add per cubic foot	0	4	0	4	0	4	0	4
42. Stone in blocks, as per Item 40, set in blue lias mortar, including hoisting and scaffolding .... per cubic foot	2	6	2	0	1	6	1	3

TABLE II.—*continued.*

Prices for Masonry, &c.

	A.		B.		C.		D.	
	s.	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*
43. If set in Portland cement, one part cement, and two parts sand............... per cubic foot	2	7	2	1	1	7	1	4
44. If set in Roman cement, half cement, half sand, per cubic foot	2	7	2	1	1	7	1	4
45. If set in Scott's hydraulic cement, one part cement and two parts sand, per cubic foot	2	6	2	0	1	6	1	3
Labour only—per super foot.								
46. Roughpicked, or scabbled face, with one inch margin drafts...	0	5	0	4	0	3	0	3
47. Ditto, ditto, ditto, curved ...	0	8	0	6	0	5	0	4
48. Neatly picked or scabbled face, including margin drafts	0	8	0	6	0	5	0	4
49. Ditto, ditto, curved............	1	0	0	9	0	8	0	7
50. Fine punched face, or neatly axed on face, including margin drafts	0	11	0	8	0	7	0	7
51. Ditto, ditto, curved............	1	5	1	0	0	11	0	11
52. Chiselled face or granite neatly axed	0	11	0	8	0	7	0	7
53. Ditto, ditto, curved............	1	5	1	0	0	11	0	11
54. Tooled face, or finely axed on granite	1	2	0	10	0	8	0	8
55. Ditto, ditto, curved............	1	7	1	2	1	0	1	0
56. Rubbed face	1	5	1	0	0	8	0	8
57. Ditto curved	1	8	1	3	0	11	0	11
58. Sunk work, neatly picked or scabbled............................	1	0	0	9	0	8	0	8
59. Ditto, ditto, curved............	1	4	1	0	0	10	0	10
60. Sunk work, finely punched	1	5	1	1	0	11	0	11
61. Ditto, ditto, curved............	1	10	1	4	1	2	1	2
62. Sunk work, chiselled	1	7	1	3	1	1	1	1
63. Ditto, ditto, curved	2	0	1	6	1	4	1	4

The columns marked A, B, C, and D relate to stones of different degrees of hardness. The column A referring to such stones as granite; B, to some of the hard sandstones; C, to some of the hard limestones; and D, to common stone of the locality.

TABLE II.—*continued.*

Prices for Masonry, &c.

LABOUR ONLY—per super foot.

	A.		B.		C.		D.	
	s.	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*
64. For sunk work, exceeding 2 inches in depth, for every extra inch ....add	0	1	0	1	0	0¾	0	0¾
65. Ditto, exceeding 3 inches in depth, for every extra inch, add	0	1½	0	1½	0	1¼	0	1¼
66. Radiated joints to voussoirs of arches..........................	0	4	0	3	0	2½	0	2½
67. Ditto, ditto, prepared for setting in putty ....add	0	7	0	5	0	4	0	4
68. For bed and joints prepared for setting in putty, as for columns, pilasters, or moulded work..........................add	0	4	0	3	0	3		
69. Moulded work	2	0	1	6	1	3	1	3
70. Ditto curved	2	8	2	0	1	8	1	8
71. Ditto, rubbed or finely tooled	2	3	1	9	1	5	1	5
72. Ditto, ditto curved...........	3	0	2	3	1	10	1	10
73. Chamfering, up to 3 inches per foot run	0	3	0	3	0	2	0	2
74. Rebating, up to 3 inches per foot run	0	4	0	4	0	3	0	3
75. Throating ...... „ „	0	1½	0	1½	0	1	0	1
76. Ditto, curved ... „ „	0	3	0	3	0	2	0	2
77. Grooving up to 4 inches in girt.................per foot run	0	5	0	5	0	4	0	4
78. Beading .... „ „	0	5	0	5	0	4	0	4
79. Arris cut to acute angles per foot run	0	2	0	2	0	1½	0	1½
80. Sinking holes, round or square, through stone 4 inches thick, not exceeding 100 square inches in area ....each	2	0	1	9	1	4	1	4
81. Do., through 6-in. stone, not exceeding 100 sq.in.area...each	2	8	2	4	1	9	1	9
82. Do., through 9-in. stone, not exceeding 100 sq.in. area...each	3	4	2	11	2	2	2	2
84. Do., through 12-in. stone, not exceeding 100 sq.in.area...each	4	0	3	6	2	7	2	7
85. Sinking rail or mortice holes round or square, not exceeding 2 inches deep...........per inch	0	4	0	4	0	3	0	3

TABLE II.—*continued.*

Prices for Masonry, &c.

LABOUR ONLY.

	A.		B.		C.		D.	
	s.	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*
86. Last item, including running in zinc and lead in equal proportion ....per inch	0	6	0	6	0	5	0	5
87. Sinking rail or mortice holes, round or square, exceeding 2 inches deep ....per inch	0	3½	0	3½	0	2½	0	2½
88. Ditto, including running in zinc and lead in equal proportions ....per inch	0	5	0	5	0	4	0	4
89. Joggles or dowels, 2 inches square, let into stone and run with Portland cement...per in.	0	3	0	3	0	2½	0	2½
90. Ditto, 2½ in. sq. ditto „	0	5	0	5	0	5	0	5
91. Cramps let in and fixed per lineal foot	1	0	1	0	0	10	0	10
92. Ditto, and run with zinc and lead in equal proportions per lineal foot	1	8	1	8	1	6	1	6
93. Letting in gate hooks, with single prong, and running with zinc and lead in equal proportions ....each	1	8	1	8	1	6	1	6
94. Ditto, with double prong, and running with zinc and lead in equal proportions ....each	2	10	2	10	2	8	2	8
95. Letting in stay-hooks and running with zinc and lead in equal proportions .....each	1	2	1	2	1	0	1	0
96. Letting in pivot boxes for gates and running with zinc and lead ....each	1	8	1	8	1	6	1	6
97. Setting stench traps ...each	2	9	2	9	2	0	2	0
98. Fitting landings to pillar pumps ....each	2	3	2	3	1	9	1	9
99. Letting in trap-door rebated frames 2-feet square, and running with zinc and lead mixed in equal proportions......each	14	0	13	0	11	0	11	0

TABLE II.—*continued.*

Prices for Masonry, &c.

STEPS AND SILLS, CURBS, AND CHANNEL STONES.

	A.		B.		C.		D.	
	s.	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*
100. Sills, plain punched or axed joints squared 3 inches, set in blue lias mortar, per cubic foot	3	0	2	6	2	3	2	0
101. Do. do. chamfered ,,	3	3	2	9	2	6	2	3
102. Steps, plain punched or axed on tread and riser, squared with 3 inch butts, set in blue lias mortar......per cubic foot	3	3	2	9	2	6	2	3
103. Do. do., winders, do. do. per cubic foot	4	1	3	7	3	3	3	0
104. Steps square as Item 102, but with 4-inch butts, and soffits neatly scabbled, set in mortar ....per cubic foot	3	11	3	5	3	1	2	10
105. Do. do., winders, do. do. per cubic foot	4	7	4	1	3	6	3	3
106. Steps chiselled on tread and riser, and soffits neatly punched, set in mortar per cubic foot	4	8	4	2	3	7	3	3
107. Do. winders, do. do. do. per cubic foot	5	6	5	0	4	2	4	0
108. Steps for circular staircase, with solid newel worked on the ends of steps, punched soffits, set in mortar per cubic foot	6	0	5	6	4	8	4	8
109. If any of the above are above 5 feet in length add per cubic foot	0	6	0	4	0	3	0	3
110. Street curbs, wrought on top and one side, squared back and bed .... per cubic foot	2	10	2	5	1	9	1	5
111. Channel stones, wrought, sunk, and laid, 4 inches thick per foot super	1	8	1	3	1	0	1	0
112. Ditto, ditto, ditto, 5 inches thick .... per foot super	2	0	1	7	1	4	1	4
113. Ditto, ditto, ditto, 6 inches thick .... per foot super	2	10	2	5	2	2	2	2

TABLE II.—*continued.*

SINK STONES.

	A. s.	A. d.	B. s.	B. d.	C. s.	C. d.	D. s.	D. d.
114. Three inch thick sink stone, complete, and laid in mortar per foot super	1	7	1	2	1	1	1	1
115. Four inch ditto, ditto, ditto	1	10	1	4	1	4	1	4
116. Five inch ditto, ditto, ditto	2	1	1	6	1	6	1	6
117. Six inch ditto, ditto, ditto	2	4	1	8	1	8	1	8

Sundries; Labour and Materials.

	s.	d.
118. Raking out and pointing rubble masonry with lime and sand or coal-ash mortar .... per foot super	0	1
119. Ditto, ditto, with Portland cement, half cement and half sand .... per foot super	0	2
120. Raking out and pointing block in course masonry with lime and sand, or coal-ash mortar per foot super	0	1
121. Ditto, ditto, with Portland cement, half cement half sand .... per foot super	0	2
122. Cutting out and priming steps......... per foot run	1	0
123. Curbs taken up, ends squared, and reset in mortar per foot cube	0	4
124. Flagging over drains, with flags 2 inches thick, bedded in mortar .... per foot super	0	4
125. Ditto, ditto, with flags 4 inches thick, bedded in mortar .... per foot super	0	6
126. Cutting out rubble masonry and making good with stone and blue lias mortar.................. per foot cube	0	5
127. Cutting out in steps and landings. and letting in pieces of hard granite, 2 inches thick, with dovetail joints, bedded in cement .... per foot super	2	0

Estimates for Culverts and Sewers.

12 feet diameter.

Fig. 19.

4·08 cubic yards brickwork per foot run.

If with counterforts, 10 feet apart from centre to centre, add 0·412 cubic yard brickwork per ft. run.

If with concrete between the counterforts, add 2·73 cubic yards concrete per foot run.

Fig. 19.

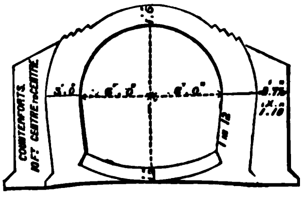


TABLE II.—*continued.*

Prices for Masonry, &c.

ESTIMATES FOR CULVERTS AND SEWERS.

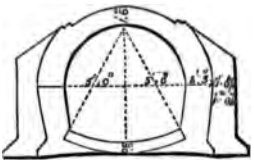
10 feet diameter.
Fig. 20.

2·827 cubic yards brickwork per foot run.

If with counterforts, 10 feet apart from centre to centre, add 0·26 cubic yard brickwork per foot run.

If with concrete between the counterforts, add 1·14 cubic yards concrete per foot run.

Fig. 20.



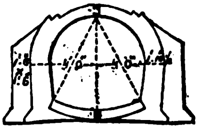
8 feet diameter.
Fig. 21.

2·205 cubic yards brickwork per foot run.

If with counterforts, 10 feet apart from centre to centre, add 0·206 cubic yard brickwork per foot run.

If with concrete between the counterforts, add 0·86 cubic yards of concrete per foot run.

Fig. 21.



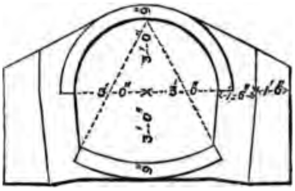
6 feet diameter.
Fig. 22.

1·308 cubic yds. brickwork, per ft. run.

If with counterforts, 10 ft. apart from centre to centre, add 0·119 cubic yards brickwork per foot run.

If with concrete between the counterforts, add 0·6 cubic yards concrete per foot run.

Fig. 22.



5 feet diameter.
Fig. 23.

1·132 cubic yards brickwork per foot run.

If with counterforts, 10 ft. apart from centre to centre, add 0·101 cubic yards brickwork per foot run.

If with concrete between the counterforts, add 0·54 cubic yards per foot run.

Fig. 23.

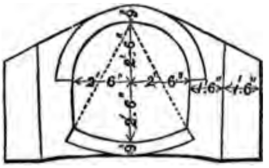


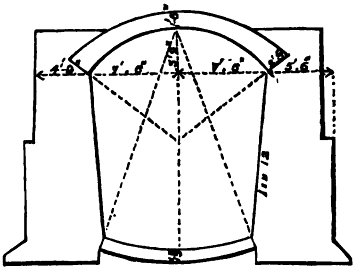
TABLE II.—*continued.*

Prices for Masonry, &c.

ESTIMATES FOR CULVERTS AND SEWERS.

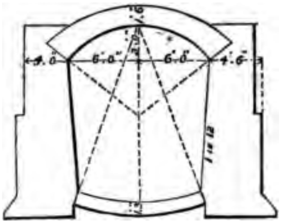
Rough rubble or random rubble in abutments.
15 feet in diameter.
Fig. 24.
1·833 cubic yards arching, per foot run.
8·747 cubic yards random rubble or rough rubble in abutments, per foot run.

Fig. 24.



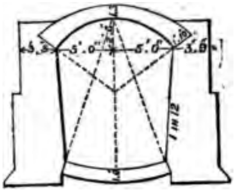
12 feet in diameter.
Fig. 25.
1·63 cubic yards arching per foot run.
5·97 cubic yards random rubble or rough rubble in abutments per foot run.

Fig. 25.



10 feet in diameter.
Fig. 26.
1·32 cubic yards arching per foot run.
3·90 cubic yards random or rough rubble in abutments per foot run.

Fig. 26.



8 feet in diameter.
Fig. 27.
0·93 cubic yards arching per foot run.
2·48 cubic yards random or rough rubble in abutments per foot run.

Fig. 27.

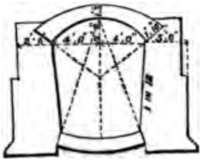


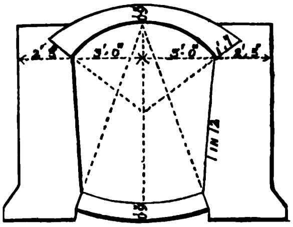
TABLE II.—*continued.*

Prices for Masonry, &c.

ESTIMATES FOR CULVERTS AND SEWERS.

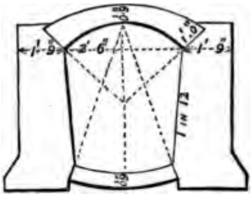
Rough rubble or random rubble in abutments.
6 feet in diameter.
Fig. 28.
0·43 cubic yards arching per foot run.
1·88 cubic yards of random or rough rubble in abutments per foot run.

Fig. 28.



5 feet diameter.
Fig. 29.
0·37 cubic yards arching per foot run.
1·53 cubic yards of random or rough rubble in abutments per foot run.

Fig. 29.



Quantities of Brickwork and Excavation for Culverts per Yard and per Mile.

Diameter of culvert, 5 feet; top and bottom thickness, 9 inches; sides, 1 foot 2 inches.
2·113 cubic yards of brickwork per yard forward.
3719 „ „ per mile.
13,470 „ excavation „
Diameter of culvert, 4 feet; thickness of brickwork, 9 inches.
1·246 cubic yards of brickwork per yard forward.
2193 „ „ per mile.
9142 „ excavation „
Diameter of culvert, 3 feet; thickness of brickwork, 9 inches.
0·981 cubic yards brickwork per yard forward.
1726 „ „ per mile.
6600 „ excavation „
Diameter of culvert, 2 feet; thickness, 4½ inches.
0·311 cubic yards brickwork per yard forward.
547 „ „ per mile.
3090 „ excavation „

TABLE II.—*continued.*

Prices for Masonry, &c.

FLAG-PAVING, PER FOOT SUPER.

Cost per mile of Brick Culverts and Cast-Iron Pipes.

Diameter of Culvert, or of Cast Iron Pipe.	Cost of Brickwork— at 15s. per cubic yard.	Cost of Brickwork— at 20 s per cubic yard.	Cost of Brickwork— at 25s. per cubic yard.	Cost of Excavation, at 1s. 6d. per cubic yd.	Total Cost for Cast Iron Pipes— at £5 per Ton.	Total Cost for Cast Iron Pipes— at £6 per Ton.
Feet	£	£	£	£	£	£
2	410	547	684	232	3092	3552
3	1295	1726	2157	495	5676	6583
4	1645	2193	2741	685	9267	10,769
5	2789	3719	4649	1010	13,885	16,134

¾ inch thickness for the 2-feet cast iron pipe; 1 inch for the 3-feet: 1¼ for the 4 feet; and 1½ for the 5 feet.

Flag-paving, per foot super.

	Granite. s.	Granite. d.	Limestone. s.	Limestone. d.	Slate. s.	Slate. d.	Yorkshire. s.	Yorkshire. d.
128. Two-inch paving, with joints squared, not less than 1½ inch. Quarry tooled on face, squared and laid complete in mortar .	...		...		0	5	0	8
129. Two and a-half inch ditto, squared not less than 2 inches	...		...		0	8	0	11
130. Three inch ditto, ditto ...	...		...		0	9	1	0
131. Four inch do., do. 2½ inches	1	4	0	10	0	11	1	2
132. Five inch do., do. 3 inches	1	6	0	11	...		1	4
133. Six inch do., do. 4 inches	1	8	1	0	...		1	6
134. Six inch, with joints squared throughout and bed scabbled to a parallel thickness..........	2	4	1	4				
135. Nine inch ditto ditto......	3	0	1	9				
136. If rubbed, chiselled, or finely axed.........add per super foot	0	3	0	2	0	3	0	3
137. Taking up and removing old flagging... per super yard	2	0						
138. Re-squaring old flagging, per super yard	2	3						
139. Re-laying ditto in mortar, per super yard	2	3						

TABLE II.—*continued.*

Prices for Masonry, &c.

	Thicknesses.					
SLATE.	½ inch.		¾ inch.		1 inch.	
	s.	*d.*	*s.*	*d.*	*s.*	*d.*
140. Self-faced slabs of Bangor slate, under 18 super feet......per foot super	0	4	0	6	0	8
141. Ditto, ditto, planed one side only per foot super	0	5	0	7	0	9
142. Ditto, ditto, planed both sides per foot super	0	6	0	8	0	10
143. Ditto, ditto, planed one side, and fixed, including drilling and countersinking joints, and stopping both holes with cement or oil putty, per super foot	0	7	0	9	1	0
144. Ditto, ditto, planed both sides, ditto per super foot	0	8	0	10	1	1
145. Rounded nosings ......per foot run	0	1½	0	2	0	2½
146. For Items 140, 141, 142, 143, 144, above 18 feet super, add per foot super	0	1½	0	1½	0	1½

	Thicknesses.					
	1¼ inch.		1½ inch.		2 inch.	
	s.	*d.*	*s.*	*d.*	*s.*	*d.*
147. Self-faced slabs of Bangor slate, under 18 super feet......per foot super	0	10	1	0	1	4
148. Ditto, ditto, planed one side only per foot super	0	11	1	1	1	5
149. Ditto, ditto, planed both sides per foot super	1	0	1	2	1	6
150. Ditto, ditto, planed one side, and fixed, including drilling and countersinking joints, and stopping both holes with cement or oil putty, per super foot	1	2	1	3	1	5
151. Ditto, ditto, planed both sides, ditto per super foot	1	3	1	4	1	6
152. Rounded nosings ......per foot run	0	3	0	3½	0	4½
153. For Items 147, 148, 150, 151, 152, above 18 feet super, add per foot super	0	1¾	0	2	0	2

154. For sanding ....per foot super	0	1½
155. Finely rubbed .... "	0	2
156. Skirting 8 inches wide and ¾ inch thick, planed, chamfered, fixed ....per foot run	0	7

TABLE II.—*continued.*

Prices for Masonry, &c.

SLATE.	s.	d.
157. Last item, 6 inches wide, ditto ....per foot run	0	6
158. Rounded corners .... „	0	4
159. Notches in risers for bearers .... „	0	3
160. Bedding and jointing fillets, including putty and screws ....per foot run	0	4
161. Ditto, ditto, including slate 4 inch by ½ inch, or smaller section ....per foot run	0	5½
162. Groove and and tongued joints............ „	0	5
163. Channels 3 inches wide and ½ inch deep „	0	4
164. Sunk rebates, and grooves 1 inch girth „	0	2
165. Wrought iron bolts and nuts, fixed complete, per lb.	0	4
166. Ditto galvanized................................ „	0	6

TABLE III.

Tunnel Estimates and Detail Prices; East Indian Railway Prices; Detailed ditto; Average ditto.

Tunnel estimates are almost always very speculative for contracts; even when we can be certain of the geological formation to be tunnelled through, we cannot be quite so clear as to any incidental contingencies we may meet with. The two following examples, which may almost be taken as instances of a minimum and maximum of cost for tunnel work, will illustrate by details of cost the variations which may constantly be expected to occur, particularly in some formations.

Lydgate Tunnel, London and North Western.

Through Coal measures; for double line of way; 25 feet wide and 23 feet 6 inches high from the soffit of arch to underside of foundations. Worked in 12-feet lengths; side walls of coursed rubble with beds of stones hammer-punched, and 2 feet 6 inches thick. Arch 2 feet thick; fitted rubble, or from scarcity of good bedding

TABLE III.—*continued.*

Tunnel Estimates.

stone, brickwork adopted; all at 20*s*. per cubic yard; 5 shafts = $289\frac{1}{3}$ lineal yards. In the execution of the works, the thickness of the arching varied from 1 foot 6 inches to 2 feet 6 inches, and the thickness of the side walls 1 foot 6 inches to 3 feet 6 inches; average quantity of masonry per yard forward = $12\frac{1}{3}$ cubic yards.

Details of Labour Prices.

			£	*s.*	*d.*
Side walls, per 12 feet lengths—					
Four masons 1¾ shifts of 8 hours = 7 @ 5*s*. 6*d*. =			1	18	6
Nine labourers 1¾ shifts of 8 hours = 15¾ @ 3*s*. 6*d*. =			2	15	1½
			£4	13	7½
Arching per 12 feet length—					
Four masons 3 shifts of 8 hours =	12				
Two ditto extra for key, 1 shift of 8 hours	= 2				
	14	@ 5*s*. 6*d*. =	3	17	0
Eleven labourers, 3 shifts of 8 hrs. =	33				
Three ditto for key, 1 shift of 8 hours	= 3				
	36	@ 3*s*. 6*d*. =	6	6	0
			£14	16	7½

Or about 4*s*. 9*d*. per cubic yard.*

Mining and tipping 4*s*. 6*d*. per cubic yard.

Allowed for setting centres 8*s*. per rib.

	£	*s.*	*d.*
The average cost of the Lydgate Tunnel, per lineal yard through rock	£26	0	0
Ditto ditto through shale	35	16	0

Average per lineal yard, 30*l*.

Buckhorn Western Tunnel, Salisbury and Yeovil Railway, through Kimmeridge clay intersected with veins of loose rubbly rock; a considerable quantity of water. Tunnel 25 feet wide.

Average, 20 cubic yards of brickwork per yard forward;

Average, 80 ,, ,, earthwork ,, ,,

Total cost of tunnel 53,000*l*., or 72*l*. per lineal yard.

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* We have known this setting sub-let at 3*s*. 6*d*. per cubic yard.

TABLE III.—*continued.*

Tunnel Estimates.

	Total Cost.	Per lineal yd. of Tunnel.		
	£	£	s.	d.
Mining and tipping	13,300	18	0	0
Headings and shafts	3,070	4	5	0
Timber	3,400	4	15	0
Iron and steel	2,250	3	0	0
Powder and grease	1,040	1	9	0
Horsework	4,300	5	16	0
Bricks, coal and sand	13,650	18	10	0
Lime and sand	1,732	2	7	0
Bricklaying	6,003	8	0	0
Setting centres about 1¼ yard apart	225	0	6	0
Temporary roads and buildings	1,095	1	10	0
Management and plant	2,650	3	10	0
Drains	400	0	10	0

A fair price for single-line tunnels is from 20*l.* to 25*l.* per yard forward; but to make this pay, there must be no unfavourable contingencies during the execution of the work.

East Indian Railway Prices.

SCINDE RAILWAY.

	Per cubic yard.	
Earth and Rock-work:—	s.	d.
Alluvial earth excavated from side-trenches or tanks and taken to bank, average lead 22 yards	0	4·9
Gravel and shale (soft)	0	4·9
Rock requiring bars but no powder	1	9
Rock requiring blasting	2	6

Masonry, &c.:—

Concrete	per cubic yard	4	6
Dry rubble	„	3	0
Common rubble in mortar	„	12	0
Coursed rubble with rubble backing	„	15	0
Coursed rubble	„	20	0
Block-in-course	„	31	6
Ashlar	per cubic foot	1	7½
Fence-walling	per lineal yard	3	0
Ditto, 4 feet high and 1′—6″ thick	„	6	6

TABLE III.—*continued.*

Details of Indian Prices for Masonry, &c.

COURSED RUBBLE.	£	*s.*	*d.*
Two good men will prepare, per day, 20 cubic feet, at 1*s.* 3*d.* per day for each man, making for 100* cubic feet	0	12	6
Two good men will set, in general work, 30 cubic feet per day, at 1*s.* 3*d.* per day for each man, making for 100 cubic feet	0	8	4
Incidental labour of coolies, smiths, bullocks, and wages for native foreman	1	1	0
	2	1	10
Add for quarrying stone, exclusive of powder, &c. per 100 cubic feet	0	7	0
Add for delivery of stone, with a 5 miles lead, and supposing each cart to contain 7 cubic feet, at 1*s.* 6*d.* per load per 100 cubic feet	1	1	5
Add for sand	0	3	0
„ for water	0	1	9
„ for lime delivered on the work	0	5	6
Per 100 cubic feet	4	0	6

Or 1*l.* 1*s.* 8¼*d.* per cubic yard.†

SUPERIOR CLASS OF UNCOURSED RUBBLE.

Two good men will prepare and set 40 cubic feet per day, at 10 annas a day for each man, making per 100 cubic feet	0	6	3
Incidental labour of coolies, smiths, bullocks, and wages for native foreman	0	16	0
	1	2	3

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* 100 and 1000 cubic feet are adopted by engineers in India as units of measurement.

† It will be observed that this price includes rather more than 25 per cent. for carriage of stone.

TABLE III.—*continued.*

Details of Indian Prices for Masonry, &c.

	£	*s.*	*d.*
Brought forward	1	2	3
Add for quarrying stone, exclusive of powder per 100 cubic feet	0	7	0
Add for delivery of stone, 5 miles lead, and supposing each cart to contain 7 cubic feet, @ 1*s.* 6*d.* per load per 100 cubic feet	1	1	5
Add for sand	0	3	3
„ for water	0	2	0
„ for lime delivered on work	0	6	0
Per 100 cubic feet	3	1	11

Or 16*s.* 8*d.* per cubic yard.*

ASHLAR.

	£	*s.*	*d.*
Two good men will prepare 8 cubic feet per day for 2*s.* 6*d.*, which multiplied by 12·5 gives for 100 cubic feet	1	11	3
Two good men will set in general work 20 cubic feet per day for 2*s.* 6*d.*, which multiplied by 5 gives for 100 cubic feet	0	12	6
Incidental labour, including coolies, smiths, native foreman's wages, &c.	1	10	6
	£3	14	3
Add for quarrying stone, exclusive of powder, per 100 cubic feet	0	8	0
Add for delivery of stone with a 5 miles lead, and supposing each cart to contain 7 cubic feet, at 1*s.* 6*d.* per cart load, per 100 cubic feet	1	1	5
Add for sand delivered on works	0	2	6
„ for water	0	1	6
„ for lime delivered on the works	0	5	6
Per 100 cubic feet	£5	13	2

Or per cubic foot, 1*s.* 4½*d.*

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* Which price includes upwards of 33 per cent. for carriage of stone.

TABLE III.—*continued.*

Details of Indian Prices for Masonry, &c.

BLOCK IN COURSE.	£	*s.*	*d.*
Two good men will prepare 12 cubic feet per day, at 1*s.* 3*d.* per day for each man, making for 100 cubic feet	1	0	10
Two good men will set in general work 20 cubic feet per day, at 1*s.* 3*d.* each man per day, or for 100 cubic feet	0	12	6
Incidental labour, including coolies, smiths, bullocks, and wages for native foreman	1	1	0
	£2	14	4
Add for quarrying stone, exclusive of powder, per 100 cubic feet	0	8	0
Add for delivery of stone with a five miles' lead, and supposing each cart to contain 7 cubic feet at 1*s.* 6*d.* per cart load .... per 100 cubic feet	1	1	5
Add for sand delivered on works	0	3	0
„ for water	0	1	9
„ for lime delivered on works	0	6	0
Per 100 cubic feet	£4	14	6

Or per cubic yard, £1 5*s*, 6¼*d.*

COMMON RUBBLE.	Per 100 cub. ft. £	*s.*	*d.*
Quarrying stone	0	6	9
Smith's work	0	1	0
Water for men	0	0	9
	£0	8	6
Haulage	0	4	3
Setting	1	0	0
Wages to native foreman	0	1	0
Lime, sand, and water	0	6	3
Tools and contingencies	0	3	4
Per 100 cubic feet	£2	3	4

Or per cubic yard, 11*s.* 9¾*d.*

TABLE III.—*continued.*

Details of Indian Prices for Masonry, &c.

COURSED RUBBLE.	Per 100 cub. ft.		
	£	*s.*	*d.*
Quarrying stone	0	12	0
Dressing stone	1	5	0
Smith's work	0	1	0
Water for men	0	0	9
Wages to native foreman	0	1	0
	£1	19	9
Haulage	0	4	6
Setting	1	1	0
Wages to native foreman	0	0	6
Lime, sand, and water	0	5	9
Per 100 cubic feet	£3	11	6

Or per cubic yard, 19*s.* 3½*d.*

BLOCK IN COURSE IN ARCHES.	Per 100 cub. ft.		
Quarrying stone	0	12	6
Dressing stone	2	10	0
Smith's work	0	1	3
Water for men	0	1	6
Wages to native foreman	0	1	3
	3	6	6
Haulage	0	6	0
Setting	1	3	0
Wages to native foreman	0	2	0
Lime, sand, and water	0	5	9
Tools, templates, and contingencies	0	8	4½
Per 100 cubic feet	5	11	7½

Or per cubic yard 1*l.* 10*s.* 2*d.*

ASHLAR.	Per 100 cub. ft.		
Quarrying stone	0	14	0
Dressing stone	3	0	0
Smith's work	0	2	4½
Water for men	0	1	0
Wages to native foreman	0	1	0
	3	18	10½

TABLE III.—*continued.*

Details of Indian Prices for Masonry, &c.

	Per 100 cub. ft. £	s.	d.
Brought forward	3	18	10½
Haulage	0	6	0
Setting	1	4	0
Wages to native foreman	0	0	9
Lime, sand, and water	0	4	0
Tools and contingencies	0	9	2
Per 100 cubic feet	6	2	9

Or per cubic yard 1*s*. 2¾*d*.

CARPENTRY IN CENTERING FOR ARCHES.

	£	s.	d.
1910 cubic feet Deodar timber, in one set of centres, at 2*s*. per cubic foot	196	0	0
36 cwt. of iron, at 1*l*. 4*s*. per cwt.	43	4	0
Carpenter's work	14	0	0
Smith's work	12	0	0
112 lbs. of nails, at 4½*d*. per lb.	2	2	0
One set of centres, cost of making	267	6	0
Cost of fixing and removing, per set	6	0	0

AVERAGE PRICES IN NORTH-WEST PROVINCES OF INDIA.

		£	s.	d.		£	s.	d.
Plain ashlar	per 100 c. ft.	7	10	0	or per c. ft.	0	1	6
Ashlar in arches	” ”	12	10	0	”	0	2	6
Rubble	” ”	2	2	0	or per c. yd.	0	11	4
Coursed rubble	” ”	2	8	0	”	0	13	0
Flagged flooring or roofing	per 100 sq. ft.	1	10	0	per sq. yd.	0	2	8½
Best brickwork	per 100 c. ft.	2	10	0	per c. yd.	0	13	6
Mortar plaster	per 100 sq. ft.	0	12	0	per sq. yd.	0	1	9½
Whitewashing	” ”	0	1	0				
Penang tile flooring	” ”	1	4	0	” ”	0	2	2
Teak timber in flooring and roofing	per 100 c. ft.	17	0	0	per c. ft.	0	3	4
Three-inch terrace work, per 100 square feet						0	10	0
Six-inch ditto ditto ditto						0	16	0
Windows and panelled doors of teak or S-âl, per sq. ft.						0	2	6

TABLE IV.

PRICES FOR BRICKWORK PER CUBIC YARD, &c.

TABLE A.

This Table applies to the best description of brickwork, and of a rather more than usually difficult character to build; as, for instance, skew work, abutments, piers, and retaining walls with Jack-arches, panelling, long narrow counterforts, &c. The mortar is supposed to be made with blue lias lime, or other of equal quality; and allowance has been made for grinding the mortar in a pug mill. A fair average allowance has been made for sand; exclusive of excavating foundations, of filling and ramming, or of backing, and inclusive of all scaffolding and centering.

	Price of Bricks delivered per 1000.		Per cubic yard.		Per 100 cubic yards.			Per 200 cubic yards.		
	s.	*d.*	*s.*	*d.*	£	*s.*	*d.*	£	*s.*	*d.*
1.	20	0	16	1	80	8	4	160	16	8
2.	22	6	17	3	86	5	0	172	10	0
3.	25	0	18	7	92	18	0	185	16	0
4.	27	6	19	8	98	7	0	196	14	0
5.	30	0	20	9	103	15	0	207	10	0
6.	32	6	21	9	108	15	0	217	10	0
7.	35	0	22	9	113	15	0	227	10	0
8.	37	6	23	9	118	15	0	237	10	0
9.	40	0	24	9	123	15	0	247	10	0
10.	42	6	25	9	128	15	0	257	0	0
11.	45	0	26	9	133	15	0	267	10	0
12.	47	6	27	9	138	15	0	277	10	0
13.	50	0	28	9	143	15	0	287	10	0
14. For Brickwork in Portland Cement or in Halkin Mountain Lime, add	...		4	9*a*	23	15	0	47	10	0

(*a*) One part cement and two parts sand.

TABLE IV.—*continued.*

Prices for Brickwork per cubic yard, &c.

A.—*continued.*

		Prices of Bricks delivered per 1000.		Per cubic yard.		Per 100 cubic yards.			Per 200 cubic yards.		
		s.	*d.*	*s.*	*d.*	£	*s.*	*d.*	£	*s.*	*d.*
15.	Brickwork in Roman Cement, add	...		2	10*b*	14	3	4	28	6	8
16.		...		4	0*c*	20	0	0	40	0	0

		Per 300 cubic yards.		Per 400 cubic yards.			Per 500 cubic yards.			Per 1000 cubic yards.		
		£	*s.*	£	*s.*	*d.*	£	*s.*	*d.*	£	*s.*	*d.*
17.	....	241	5	321	13	4	401	1	8	802	3	4
18.	....	258	15	345	0	0	431	5	0	862	10	0
19.	....	278	14	371	12	0	464	10	0	929	0	0
20.	....	295	1	393	8	0	491	5	0	982	0	0
21.	....	311	5	415	0	0	518	15	0	1037	10	0
22.	....	326	5	435	0	0	543	15	0	1087	10	0
23.	....	341	5	455	0	0	568	15	0	1137	10	0
24.	....	356	5	474	10	0	592	15	0	1185	10	0
25.	....	371	5	495	0	0	618	15	0	1237	10	0
26.	....	386	5	515	0	0	643	15	0	1287	10	0
27.	....	401	5	535	0	0	668	15	0	1337	10	0
28.	....	416	5	555	0	0	693	15	0	1387	10	0
29.	....	431	5	575	0	0	718	15	0	1437	10	0
30.	For Brickwork in Portland Cement or in Halkin Mountain Lime, add	71	5	95	0	0	118	15	0	237	10	0
31.	Brickwork in Roman Cement, add	43	0	57	3	4	71	6	8	143	13	4
32.		60	0	80	0	0	100	0	0	200	0	0

(*a*) One part Roman cement and two parts sand. (*b*) One part Roman cement and one part sand.

TABLE IV.—*continued.*

Prices for Brickwork per cubic yard, &c.

TABLE B.

This Table applies to equally good work as Table A, but of a less difficult character to construct, and not so highly finished; for instance, as regards the number of arrises and returns. It will be applicable to bridge arches, square, to piers and plain parapet walls, to wing walls, &c. Blue lias mortar, or of other lime of equal quality, with allowance for grinding in a pug mill; exclusive of excavating foundations, filling and ramming, or of backing.

	Price of Bricks delivered per 100.		Per cubic yard.		Per 100 cubic yards.			Per 200 cubic yards.		
	s.	*d.*	*s.*	*d.*	*£*	*s.*	*d.*	*£*	*s.*	*d.*
33.	20	0	14	5	72	1	8	444	3	4
34.	22	6	15	7	77	18	4	155	16	8
35.	25	0	16	9	83	15	0	167	10	0
36.	27	6	17	10	89	3	4	178	6	8
37.	30	0	18	10	94	3	4	188	6	8
38.	32	6	19	10	99	3	4	198	6	8
39.	35	0	20	10	104	3	4	208	6	8
40.	37	6	21	10	109	3	4	218	6	8
41.	40	0	22	10	114	3	4	228	6	8
42.	42	6	23	10	119	3	4	238	6	8
43.	45	0	24	10	124	3	4	248	6	8
44.	47	6	25	10	129	3	4	258	6	8
45.	50	0	26	10	134	3	4	268	6	8

	Per 300 cubic yards.		Per 400 cubic yards.			Per 500 cubic yards.			Per 1000 cubic feet.		
	£	*s.*	*£*	*s.*	*d.*	*£*	*s.*	*d.*	*£*	*s.*	*d.*
46.	216	5	288	6	8	360	8	4	720	16	8
47.	233	15	311	13	4	389	11	8	779	3	4
48.	251	5	334	0	0	417	15	0	835	10	0
49.	267	10	356	13	4	445	16	8	891	13	4
50.	282	10	376	13	4	470	16	8	841	13	4
51.	297	10	396	13	4	495	16	8	991	13	4
52.	312	10	416	13	4	520	16	8	1041	13	4
53.	327	10	436	13	4	545	16	8	1091	13	4
54.	342	10	456	13	4	570	16	8	1141	13	4
55.	357	10	476	13	4	595	16	8	1191	13	4
56.	372	10	496	13	4	620	16	8	1241	13	4
57.	387	10	516	13	4	645	16	8	1291	13	4
58.	402	10	536	13	4	670	16	8	1341	13	4

See Table A for brickwork in Portland or Roman cement, &c.

TABLE IV.—*continued.*

Prices for Brickwork per Cubic Yard, &c.

TABLE C.

This Table applies to brickwork in heavy masses—as, for instance, thick abutments, piers, and retaining walls, without panelling or Jack-arches, and with thick solid counterforts, and generally of that kind of work which involves less labour in setting; exclusive of excavating foundations, of filling and ramming, or of backing.

	Price of Bricks delivered per 1000.		Per cubic yard.		Per 100 cubic yards.			Per 200 cubic yards.		
	s.	*d.*	*s.*	*d.*	£	*s.*	*d.*	£	*s.*	*d.*
59.	20	0	13	8	68	3	8	136	7	4
60.	22	6	14	9	73	15	0	147	10	0
61.	25	0	15	10	79	3	4	158	6	8
62.	27	6	16	11	84	11	8	169	3	4
63.	30	0	18	0	90	0	0	180	0	0
64.	32	6	19	0	95	0	0	190	0	0
65.	35	0	20	0	100	0	0	200	0	0
66.	37	6	21	0	105	0	0	210	0	0
67.	40	0	22	0	110	0	0	220	0	0
68.	42	6	23	0	115	0	0	230	0	0
69.	45	0	24	0	120	0	0	240	0	0
70.	47	6	25	0	125	0	0	250	0	0
71.	50	0	26	0	130	0	0	260	0	0

	Per 300 cubic yards.			Per 400 cubic yards.			Per 500 cubic yards.			Per 1000 cubic yards.		
	£	*s.*	*d.*	£	*s.*	*d.*	£	*s.*	*d.*	£	*s.*	*d.*
72.	204	11	0	272	14	8	340	18	4	681	16	8
73.	221	5	0	295	0	0	368	15	0	737	10	0
74.	237	10	0	316	13	4	395	16	8	791	13	4
75.	253	15	0	338	6	8	422	18	4	845	16	8
76.	270	0	0	360	0	0	450	0	0	900	0	0
77.	285	0	0	380	0	0	475	0	0	950	0	0
78.	300	0	0	400	0	0	500	0	0	1000	0	0
79.	315	0	0	420	0	0	525	0	0	1050	0	0
80.	330	0	0	440	0	0	550	0	0	1100	0	0
81.	345	0	0	460	0	0	575	0	0	1150	0	0
82.	360	0	0	480	0	0	600	0	0	1200	0	0
83.	375	0	0	500	0	0	625	0	0	1250	0	0
84.	390	0	0	520	0	0	650	0	0	1300	0	0

See Table A for brickwork in cement.

TABLE IV.—*continued.*

Prices for Brickwork.

	s.	*d.*
85. Cutting holes in brick walls to receive the ends of girders, rails, &c., and making good, 1 foot superficial area,		
4 inches deep, each	0	5
9 inches deep, each	0	9
14 inches deep, each	1	0
18 inches deep, each	1	4
86. Cutting holes in or through brick walls, not exceeding 60 square inches in section for corbles, drains, &c., &c., and making good with stock-brickwork in mortar, per inch thickness	0	2½
87. Ditto, ditto, ditto, exceeding 60 and not exceeding 120 square inches in section .... per inch thickness	0	3
88. Ditto, ditto, ditto, exceeding 120 and not exceeding 200 square inches in section .... per inch thickness	0	4
89. Ditto, ditto, ditto, exceeding 200 and not exceeding 330 square inches in section .... per inch thickness	0	5
90. Jumping-holes through brick walls for bolts, bars, &c., 9 inches thick and upwards, and making good...per inch	0	0½
91. Cutting through brick walls for doors, windows, &c., and making good ....per cubic foot	0	2
92. Cutting out for, and lining old walls with, two courses of stretchers and one course of headers in height alternately, in mortar ....per yard super	4	9
93. Ditto, ditto, ditto, in cement .... „	5	9
94. Drawing out defective bricks from old work and making good with new bricks in mortar ....each	0	1
95. Ditto, ditto, ditto, in detached work .... „	0	2
96. Cutting chamfers for stucco and rough splays per foot super	0	2½
97. Ditto and pargetting chase, or indent „	0	2½
98. Ditto external angles for face work ... „	0	3
99. Ditto internal ditto .... „	0	2½
100. Ditto intersections or points of groins and rubbing fair.. per foot super	0	7
101. Hoop iron, including coating with tar and sanding building in joints of brickwork ....per lb.	0	1½

TABLE IV.—*continued.*

Prices for Brickwork.

MATERIALS ONLY.

			s.	*d.*
102.	Bricks of useful quality *may** be had in the country at	per thousand from 16*s.* to	25	0
103.	Bricks, hard, well burnt and well shaped stocks, fit for foundations or inside work	per 1000	26	0
104.	Ditto, ditto, ditto, fit for ordinary front work	„	32	0
105.	Ditto, ditto, ditto, picked for front work...	„	39	0
106.	Ditto, marl rubbers	„	48	0
107.	Ditto, Staffordshire bricks, stocks	„	30	0
108.	Ditto, Stourbridge fire-bricks, ordinary size	per 100	8	4
109.	Fire-clay, Stourbridge or Flintshire	per bushel	2	0
110.	Fire lumps ditto ditto 14 inch ...	each	1	3
111.	Ditto ditto ditto 16 inch ...	„	1	6
112.	Ditto ditto ditto 18 inch ...	„	1	10
113.	Ditto ditto ditto 24 inch ...	„	2	6
114.	Blue lias lime, unslaked	per cubic foot	0	6
115.	Best local ditto, ditto	„	0	4
116.	Portland cement	per bushel	2	6
117.	Roman cement	„	1	9
118.	Scott's hydraulic cement, prepared from blue lias lime	„	1	3
119.	Mortar, local lime........................	per cubic foot	0	4
120.	Blue-pointing mortar	„	0	6
121.	Hair mortar	„	0	5
122.	Ditto, ditto, fine stuff	„	0	6
123.	Blue lias mortar	„	0	6

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* This will occur more or less in all places where there is good brick earth, but no demand for bricks; it is one of those points which require careful investigation before determining on estimates in which brickwork forms an important item.

TABLE V.

PRICES FOR TIMBER AND CARPENTER'S WORK.

	TIMBER IN BALK.	Per load of 50 cubic feet.		
	ENGLISH OAK, ROUGH.*	£	s.	d.
1.	200 cubic feet and upward in a log	8	1	0
2.	150 ditto ditto ditto	7	14	6
3.	149 ditto to 100 cubic feet	6	19	6
4.	99 ditto to 50 ditto	6	14	6
5.	49 ditto to 25 ditto	6	0	0
5*a*.	Under 25 cubic feet in a log	4	0	0
	English oak, sided—			
6.	100 cubic feet and upward in a log	13	5	0
7.	99 ditto to 80 cubic feet in a log	11	17	6
8.	79 ditto to 60 ditto ditto	11	7	6
9.	59 ditto to 40 ditto ditto	10	19	6
10.	39 ditto to 20 ditto ditto	10	9	6
10*a*.	Under 20 cubic feet in a log	7	14	6
	Moulmein teak—			
11.	17½ inches and upwards	12	13	8
12.	17 ditto to 15½ inches	11	1	8
13.	15 ditto to 11 ditto	9	13	4
	African oak—			
14.	17½ inches siding and upwards	12	7	6
15.	15½ ditto, ditto, to 17 inches	12	5	0
16.	11 ditto, ditto, to 15 ditto	11	0	0
	Spanish oak—			
17.	18½ inches siding and upwards	11	14	0
18.	15½ ditto, ditto, and under 18 inches	11	9	2
19.	15 ditto, ditto, and under 12 ditto	10	19	4
	Green heart—			
20.	17½ inches siding and upwards	9	16	0
21.	17 ditto, ditto, to 15½ inches	9	9	0
22.	15 ditto, ditto, to 12 ditto	9	0	0
23.	English elm of all classes of contents, from 60 cubic feet to 200 and upwards	3	13	6
24.	Add 38*s*. per load for logs of 19 inches siding and 24 feet in length.			
	Fir timber—			
25.	Riga fir	3	12	0
26.	Red pine	4	3	10
27.	Yellow pine	3	14	10
28.	Dantzig fir	3	9	0
	Pitch pine—			
29.	17 inches siding to 16½ inches	4	6	9
30.	16 ditto ditto to 15½ ditto	3	16	9

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* The offal from rough English oak is taken at rather less than one half.

TABLE V.—*continued.*

Prices for Timber and Carpenter's Work.

TIMBER IN BALK.

		Per cub. ft.	
		s.	*d.*
31.	English oak in logs under 100 cubic feet	4	8
32.	Ditto ditto ditto 50 ditto	3	9
33.	Moulmein teak, 17 inches siding	5	0
34.	Ditto ditto, 15 inches siding and upwards	4	5
35.	Ditto ditto, 11 inches siding and upwards	3	10
36.	African oak, 17 inches siding and upwards	5	0
37.	15 inches siding and upwards	4	10
38.	11 inches siding and upwards	4	5
39.	Spanish oak, 18 inches siding and upwards	4	8
40.	15 inches siding and upwards	4	7
41.	12 inches siding and upwards	4	5
42.	Greenheart, 17 inches siding and upwards	4	0
43.	15 inches siding and upwards	3	9
44.	12 inches siding and upwards	3	7
45.	Elm .... 17 inches siding and upwards	2	4
46.	15 inches siding and upwards	2	0
47.	12 inches siding and upwards	1	9
	Fir—		
48.	Riga	1	6
49.	If exceeding 50 feet in length	1	10
50.	Red Pine	1	9
51.	Ditto, exceeding 50 feet in length	2	3
52.	Yellow Pine	1	6
53.	Ditto, exceeding 50 feet in length	1	10
54.	Dantzig fir	1	5
54*a*.	Ditto, exceeding 50 feet in length	1	9
	Pitch pine—		
55.	16½ inches siding and upwards	1	9
56.	15 inches siding and upwards	2	3
57.	Ash in round logs	2	9
58.	Beech in poles from 5 inches to 8 inches diameter	1	9
59.	Ditto ditto from 8 inches to 12 inches diameter	2	0
60.	Ditto in large sizes	2	8
61.	Elm, 8 inches siding and upwards	1	4
62.	Do., 15 inches siding and upwards	1	9
62*a*.	American oak	3	0
63.	Deals, planks and battens—Memel, Norway, or Baltic .... per super foot	0	6½
64.	Ditto, ditto, ditto—Quebec or St. John's ......ditto	0	4½

TABLE V.—*continued.*

Prices for Timber and Carpenters' Work.

	TIMBER IN SCANTLINGS.	Per cub. ft. s.	 d.
65.	Oak,* English, above 144 square inches in section	6	3
66.	Ditto, ditto above 81 ditto ditto, and not exceeding 144	5	6
67.	Oak, English, above 36 square inches in section, and not exceeding 81	5	0
68.	Ditto, ditto, not exceeding 36 sq. in. in section	4	8
69.	Ditto, ditto, if above 14 feet in length and not exceeding 20 feet .... add per cubic foot	0	6
70.	Ditto, ditto, exceeding 20 ft. in length, add per cub. ft.	1	1
71.	Ditto, ditto, if cut arriswise......ditto ditto	0	3
72.	Moulmein teak, not exceeding 17 inches siding	6	0
73.	Ditto ditto, ditto 15 ditto	5	4
74.	Ditto ditto, ditto 11 ditto	4	7
75.	African oak, ditto 17 ditto	6	0
76.	Ditto ditto, ditto 15 ditto	5	9
77.	Ditto ditto, ditto 11 ditto	5	3
78.	Spanish oak, ditto 18 ditto	5	7
79.	Ditto ditto, ditto 15 ditto	5	6
80.	Ditto ditto, ditto 12 ditto	5	3
81.	Greenheart, ditto 17 ditto	4	9
82.	Ditto, ditto 15 ditto	4	6
83.	Ditto, ditto 12 ditto	4	4
84.	Elm, ditto 17 ditto	2	9
85.	Ditto, ditto 15 ditto	2	5
86.	Ditto, ditto 12 ditto	2	1
87.	Fir, Riga	1	10½
88.	Ditto, ditto, if exceeding 50 feet in length	2	3½
89.	Ditto, red pine	2	2
90.	Ditto, ditto, if exceeding 50 feet in length	2	10
91.	Ditto, yellow pine	1	10½
92.	Ditto, ditto, if exceeding 50 feet in length	2	3½
93.	Ditto, Dantzig	1	10
94.	Ditto, ditto, if exceeding 50 feet in length	2	3
95.	Pitch pine, not exceeding 16 inches siding	2	3
96.	Ditto, ditto, ditto 15 ditto	2	10
97.	Ash in round logs	3	5
98.	Beech in poles from 5 to 8 inches diameter	2	3
99.	Ditto ditto from 8 to 12 inches diameter	2	6
100.	Ditto in large sizes	3	10
101.	Elm, not exceeding 8 inches siding	1	8
102.	Ditto, „ 15 „	2	2
103.	American oak	3	9

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* The highest dimension not to exceed 18 inches.

TABLE V.—*continued.*

Prices for Timber and Carpenter's Work.

PLANKS AND BOARDS.

PER FOOT SUPER.

	½ inch.		¾ inch.		1 inch.		1¼ inch.		1½ inch.	
	s.	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*
104. Fir, Memel, Riga, or Dantzig	0	1¾	0	2½	0	3	0	3½	0	4½
105. American pine	0	1¾	0	2¼	0	2¾	0	3¼	0	3¾
106. American white deal	0	1¼	0	1¾	0	2¼	0	2¾	0	3¼
107. Ash	0	2½	0	3¼	0	4¼	0	5	0	6
108. Beech	0	2	0	2½	0	3¼	0	3¾	0	4½
109. Elm	0	2	0	2½	0	3¼	0	3¾	0	4½
110. Oak, English	0	3½	0	4¾	0	6	0	7¼	0	8½
111. Oak, American	0	2½	0	3¼	0	4	0	5	0	6
112. Wainscot	0	5	0	7	0	8¾	0	10¾	1	0¾
113. Mahogany, Honduras	0	5	0	7	0	8¾	0	10¾	1	0¾
114. Deals or battens, Christiana, Petersburg, Archangel, or Memel	0	1¾	0	2½	0	3	3	3½	0	4¼

PER FOOT SUPER.

	2 inches.		2½ inches.		3 inches.		4 inches.	
	s.	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*
115. Fir, Memel, Riga, or Dantzig	0	5¼	0	6½	0	7½	0	10
116. American pine	0	4¾	0	5¾	0	6¾	0	8¾
117. American white deal	0	4	0	4¾	0	5¼		
118. Ash	0	7¾	0	9½	0	11	1	2½
119. Beech	0	5¾	0	7	0	8	0	10½
120. Elm	0	5¾	0	7	0	8	0	10½
121. Oak, English	0	11	1	1½	1	4	1	9
122. Oak, American	0	7¾	0	9½	0	11	1	2½
123. Wainscot	1	4½	1	8¼	2	0		
124. Mahogany, Honduras	1	4½	1	8¼	2	0		
125. Deals or battens, Christiana, Petersburg, Archangel, or Memel	0	5¼	0	6½	0	7½		

TABLE V.—*continued.*

Prices for Timber and Carpenter's Work.

Timber fixed, but not framed. The following prices include spikes, nails, and oak treenails, and all labour in preparing and connecting the timbers together by notching, lapping, bevel, or bird's-mouth cutting, or halving,—to bond timbers, plates, lintels, sleepers, floor and ceiling joists, hip and common rafters, purlins and girders, and all hoisting, fitting, and fixing:—

Measured Nett.	Per cubic foot.			
	Straight.		Curved.	
	s.	*d.*	*s.*	*d.*
126. Fir,* under 144 square inches sectional area	2	10	4	3
127. Ditto, exceeding 144 ditto ditto ...	2	9	4	1
128. Ditto, if wrought, add to either of the above items	0	5	0	7½
129. Ditto, ditto, if rounded ....add	0	3	0	4½
130. Ditto, if chamfered ....add	0	1	0	1½
131. Ditto, girders, cut down the middle, reversed and bolted, including labour of fixing iron work	2	2		
132. Ditto, ditto, if trussed with oak trusses, including trusses, add to last item...............	1	1		
133. English oak† in scantlings, above 81, and not exceeding 144 square inches sectional area	6	2	9	3
134. Ditto, ditto, ditto, above 36, and not exceeding 81 square inches sectional area	5	10	8	9
135. Ditto, ditto, ditto, not exceeding 36 square inches sectional area	5	6	8	3
136. Ditto, ditto, ditto, if wrought, add to the last three items	0	7	0	9
137. Ditto, ditto, ditto, if rounded ....add	0	4	0	5½
138. Ditto, ditto, ditto, if chamfered.........add	0	1½	0	2
139. Ditto, ditto, ditto, exceeding 14, and not exceeding 20 feet in length ....add	0	9	0	9
140. Ditto, ditto, ditto, exceeding 20 feet in length...add	1	3	1	3

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* Including piles, with heading and pointing, and fixing hoops and shoes, but not driving.

† Items 23 to 37. When plates have timbers framed to them, 5*d.* for fir, and 6*d.* for oak, to be allowed on such plates.

TABLE V.—*continued.*

Prices for Timber and Carpenter's Work.

Timber fixed and framed, including all modes of connecting by mortice and tenon, and dovetailing, and all spikes, nails, and oak treenails, all workmanship in preparing and fixing, fitting, and all hoisting.

	Per foot cube.			
	Straight.		Curved.	
	s.	*d.*	*s.*	*d.*
141. Fir	3	4	5	2
142. Ditto, cut arriswise, canted, splayed, or weathered	4	0		
143. Ditto, wrought	3	9	5	7
144. Ditto, ditto, and chamfered	3	10	5	8
145. Ditto, wrought and rounded	4	0	5	3
146. Ditto, if tapered ... add	0	4	0	6
147. Ditto, wrought and rebated	4	2	5	6
148. Ditto, wrought, rebated, and beaded or chamfered	4	4	5	8
149. Ditto, trussed girders, including oak trusses, and fixing ironwork	4	8		
150. Use and depreciation, including fixing and removing	1	0		
151. Oak, above 81, and not exceeding 144 square inches sectional area	6	8	10	0
152. Ditto, wrought	7	1	10	7
153. Ditto, wrought and rebated	7	6	11	1
154. Ditto, wrought, rebated, and beaded or chamfered	7	7	11	4
155. Ditto, if rounded ... add	0	4	0	5
156. Ditto, if tapered ... add	0	5	0	5
157. Ditto, above 36, and not exceeding 81 square inches sectional area	6	5	9	7
158. Ditto, wrought	7	0	10	4
159. Ditto, ditto, and rebated	7	4	11	0
160. Ditto, wrought, rebated, and beaded or chamfered	7	6	11	3
161. Ditto, if rounded ... add	0	4	0	4
162. Ditto, if tapered ... add	0	6	0	6
163. Ditto, not exceeding 36 sq. in. sectional area	6	3	9	9
164. Ditto, wrought	6	9	10	9
165. Ditto, ditto, and rebated	7	2	11	7
166. Ditto, ditto, ditto, and beaded or chamfered	7	5	12	0
167. Ditto, if rounded ... add	0	5	0	5
168. Ditto, if tapered ... add	0	6	0	6

TABLE V.—*continued.*

Prices for Timber and Carpenter's Work.

			Per ft. cube. Straight.
169. For oak above 14 and not exceeding 20 feet length add	per cubic foot		0 9
170. Ditto, exceeding 20 feet in length	„	„	1 3
171. Cut arriswise or splayed	„	„	0 4

COMMON BOARDING,		DEAL.		
		¾ inch.	1 inch.	1¼ inch.
172. With bevelled heading, joints, straight or raking, fixed complete.		s. d.	s. d.	s. d.
173. Rough	per square	22 6	28 0	33 6
174. Edges short	„	24 0	30 0	36 0
175. Wrought O. S., edges short	„	26 0	32 0	38 0
176. Wrought B. S., edges short	„	27 6	33 6	39 6
177. If tongued or rebated, add	„	2 6	3 6	4 6
178. If tongued with hoop iron* add	„	...	...	5 0
179. If beaded, to each side „	„	1 0	1 0	1 0
180. If curved .... „	„	2 0	2 0	2 6
181. If in ceilings and fixed from beneath.....................add	„	1 0	1 0	1 6

COMMON BOARDING,		DEAL.		
		1½ inch.	2 inch.	3 inch.
With bevelled heading joints, straight or raking, fixed complete.		s. d.	s. d.	s. d.
Rough	per square	39 0	50 0	71 0
Edges short	„	42 0	53 0	75 0
Wrought O. S., edges short...	„	44 6	55 6	77 6
Wrought B. S., edges short ...	„	46 0	57 6	79 6
If tongued or rebated ... add	„	5 6	6 0	7 0
If tongued with hoop iron* „	„	6 0	7 0	8 0
If beaded, to each side... „	„	1 3	1 3	1 6
If curved .... „	„	3 0	3 6	4 6
If in ceilings and fixed from beneath ....add	„	1 6	2 0	3 0

* Hoop iron tongues to be of the following sizes: No. 17 gauge and 1⅛ inch wide for 1¼ stuff; No. 16 gauge and 1¼ wide for 1½ stuff; No. 15 gauge and 1⅜ wide for 2 inch stuff; No. 15 gauge and 1½ inch wide for 2½ and 3 inch stuff.

TABLE V.—*continued.*

Prices for Timber and Carpenter's Work.

SUPERIOR BOARDING,		DEAL.		
		⅝ inch.	¾ inch.	1 inch.
With straight joints and tongued headings, secured with nails or staples, fixed straight or raking.		*s.* *d.*	*s.* *d.*	*s.* *d.*
182. Wrought O. S., edges short,	per sq.	22 0	28 0	34 6
183. Wrought B. S., ditto	„	24 0	30 0	36 6
184. If tongued and rebated, add	„	2 6	3 0	4 0
185. If beaded or chamfered „	„	1 0	1 0	1 0
PREPARED FROM BATTEN WIDTHS.				
186. Wrought O. S., edges short	„	23 6	30 0	36 6
187. Wrought B. S., edges short	„	25 6	32 0	38 6
188. If tongued or rebated ...add	„	3 0	4 0	5 0
189. If beaded or chamfered, to each side .... add	„	1 3	1 3	1 3
190. If curved.................. „	„	1 6	2 0	2 0
191. If in ceiling fixed from beneath ....add	„	1 0	1 0	1 0
192. If copper nails instead of iron .... add	„	3 6	5 0	6 6

SUPERIOR BOARDING.		1¼ inch.	1½ inch.	2 inch.
		s. d.	*s.* *d.*	*s.* *d.*
Wrought O. S., edges short	per sq	41 0	47 6	59 0
Wrought B. S., ditto	„	43 0	50 0	61 6
If tongued and rebated ......add	„	5 0	6 0	8 0
If tongued with hoop iron*...add	„	5 6	6 6	9 0
If beaded or chamfered...... „	„	1 0	1 3	1 3
PREPARED FROM BATTEN WIDTHS.				
Wrought O. S., edges short	„	43 6	50 0	62 0
Wrought B. S., edges short	„	45 6	52 0	64 6
If tongued and rebated ......add	„	6 6	8 0	9 0
If tongued with hoop iron*...add	„	7 6	9 0	10 6
If beaded or chamfered, to each side add	per sq.	1 6	1 6	1 6
If curved ....add	„	2 6	3 0	4 0
If in ceiling fixed from beneath add	„	1 6	1 6	2 0
If copper nails instead of iron, add	„	8 6	11 0	

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* Hoop iron tongues to be of the following sizes: No. 17 gauge and 1⅛ inch wide for 1¼ stuff; No. 16 gauge and 1¼ wide for 1½ stuff; No. 15 gauge and 1⅜ for 2 inch stuff; No. 15 gauge and 1½ inch wide for 2½ and 3 inch stuff.

TABLE V.—*continued.*

Prices for Timber and Carpenter's Work.

OAK.

Straight or raking, including glue joints or beading where necessary, fixing and nails, and applying to every description of work not particularly specified.

Curved work, bent in fixing, to be charged one and one-fourth the price of straight. Curved face, as to cylinders, &c., to be charged one and a half more than straight. Curved on plan to be charged twice the price of straight. Curved work, glued up in thicknesses, to be charged three times the price of straight.

PER FOOT SUPER.

	½ inch.		¾ inch.		1 inch.		1¼ inch.	
	s.	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*
193. Rough	0	4¾	0	6	0	7½	0	9
194. Edges shot	0	5¼	0	6¾	0	8½	0	10
195. Wrought one side, edges shot	0	6	0	7½	0	9¼	0	10¾
196. Wrought both sides, edges shot	0	6¾	0	8¼	0	10	0	11½
197. Wrought one side, and framed or clamped	0	8	0	9½	0	11½	1	1½
198. Wrought both sides and framed or clamped	0	8¾	0	10¼	1	0¼	1	2¼
199. Wrought one side and dovetailed	0	8	0	9½	0	11½	1	1½
200. Wrought both sides and dovetailed	0	8¾	0	10¼	1	0¼	1	2¼
201. If ploughed and tongued or rebated ... add	0	0¾	0	1	0	1¼	0	1½
202. If keyed as dado ... add	0	1	0	1¼	0	1½	0	1¾
203. If hung with hinges, add to items, exclusive of hinges and screws	0	0¾	0	0¾	0	1	0	1

TABLE V.—*continued.*

Prices for Timber and Carpenter's Work.

OAK.

Straight or raking, including glue joints or beading where necessary, fixing and nails, and applying to every description of work not particularly specified.

Curved work, bent in fixing, to be charged one and one-fourth the price of straight. Curved face, as to cylinders, &c., to be charged one and a half more than straight. Curved on plan, to be charged twice the price of straight. Curved work, glued up in thicknesses, to be charged three times the price of straight.

	PER FOOT SUPER.							
	1½ inch.		2 inch.		2½ inch.		3 inch.	
	s.	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*
Rough	0	10½	1	1½	1	4¼	1	7
Edges shot	0	11¾	1	3	1	6	1	9
Wrought one side, edges shot	1	0½	1	3¾	1	6¾	1	9¾
Wrought both sides, edges shot	1	0¼	1	4½	1	7½	1	10½
Wrought one side and framed or clamped	1	3½	1	7½	1	11	2	2
Wrought both sides and framed or clamped	1	4¼	1	8¼	1	11¾	2	2¾
Wrought one side and dovetailed	1	3½	1	7½	1	11	2	2
Wrought both sides and dovetailed	1	4¼	1	8¼	1	11¾	2	2¾
If ploughed and tongued or rebated ... add	0	1½	0	1¾	0	2	0	2¼
If keyed as dado ... add	0	1¾						
If hung with hinges, add to items, exclusive of hinges and screws.	0	1¼	0	1¾	0	1¾	0	2

TABLE V.—*continued.*

Prices for Timber and Carpenter's Work.

DEAL.

Straight or raking, including glue joints or beading, where necessary, fixing and nails, and applying to every description of work not particularly specified.

Curved work, bent in fixing, to be charged one and one fourth the price of straight. Curved face, as to cylinders, &c., to be charged one and a half more. Curved on plan to be charged twice the price of straight. Curved work; glued up in thicknesses, to be charged three times the price of straight.

	PER FOOT SUPER.							
	½ inch.		¾ inch.		1 inch.		1¼ inch.	
	s.	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*
204. Rough	0	2½	0	3¼	0	4	0	4¾
205. Edges shot	0	3	0	3¾	0	4½	0	5¼
206. Wrought one side, edges shot	0	3½	0	4¼	0	5	0	5¾
207. Wrought two sides and edges shot	0	3¾	0	4½	0	5½	0	6¼
208. Wrought one side and framed or clamped	0	4½	0	5½	0	6½	0	7½
209. Wrought two sides and framed or clamped	0	5	0	6	0	7	0	8
210. Wrought one side and dovetailed	0	4½	0	5½	0	6½	0	7½
211. Wrought two sides and dovetailed	0	5	0	6	0	7	0	8
212. If ploughed and tongued or rebated joints, add to items	0	0½	0	0½	0	0¾	0	0¾
213. If keyed to dado, add to items	0	0½	0	0¾	0	1	0	1
214. If hung with hinges, add to items, exclusive of hinges and screws	0	0¾	0	0¾	0	0¾	0	1

TABLE V.—*continued.*

Prices for Timber and Carpenter's Work.

Curved work, bent in fixing, to be charged one and one fourth the price of straight. Curved face, as to cylinders, &c., to be charged one and a half more. Curved on plan to be charged twice the price of straight. Curved work, glued up in thicknesses, to be charged three times the price of straight.

DEAL.

Straight or raking, including glue joints or beading, where necessary, fixing and nails, and applying to every description of work not particularly specified.

	PER FOOT SUPER.							
	1½ inch.		2 inch.		2½ inch.		3 inch.	
	s.	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*
Rough	0	5½	0	7	0	8½	0	10
Edges shot	0	6¼	0	7¾	0	9½	0	11¼
Wrought one side, edges shot	0	6¾	0	8½	0	10¼	1	0
Wrought two sides and edges shot	0	7¼	0	9	0	10¾	1	0½
Wrought one side and framed or clamped	0	8½	0	10½	1	0½	1	2½
Wrought two sides and framed or clamped	0	9¼	0	11¼	1	1¼	1	3½
Wrought one side and dovetailed	0	8½	0	10½	1	0½	1	2½
Wrought two sides and dovetailed	0	9¼	0	11¼	1	1¼	1	3½
If ploughed and tongued or rebated joints, add to items	0	1	0	1	0	1¼	0	1½
If keyed to dado, add to items	0	1¼	0	1¼	0	1½	0	1½
If hung with hinges, add to items, exclusive of hinges and screws	0	1¼	0	1¼	0	1½	0	1½

TABLE V.—*continued.*

Prices for Timber and Carpenters' Work.

WAINSCOT.

Straight or raking, including glue joints or beading where necessary, fixing and nails, and applying to every description of work not particularly specified.

Curved work, bent in fixing, to be charged one and one-fourth the price of straight. Curved face, as to cylinders, &c., to be charged one and a half more than straight. Curved on plan to be charged twice the price of straight. Curved work, glued up in thicknesses, to be charged three times the price of straight.

	PER FOOT SUPER.							
	¼ inch.		½ inch.		¾ inch.		1 inch.	
	s.	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*
215. Rough	0	4¼	0	6¼	0	8¼	0	10¼
216. Edges shot	0	4¾	0	7	0	9¼	0	11½
217. Wrought one side, edges shot	0	5½	0	7¾	0	10	1	0
218. Wrought both sides, edges shot	0	6¼	0	8½	0	10¾	1	1
219. Wrought one side, and framed or clamped	0	7½	0	10	1	0¾	1	3
220. Wrought both sides, and framed or clamped	0	8¼	0	10¾	1	1½	1	4
221. Wrought one side and dovetailed	0	7½	0	10	1	0¾	1	3
222. Wrought both sides and dovetailed	0	8½	0	11	1	1¾	1	4½
223. If ploughed and tongued, or rebated joints ....add	0	0¾	0	1	0	1¼	0	1½
224. For deal, oak, or wainscot put together with white-lead, add	...		0	0¼	0	0¼	0	0½
225. If plugged to walls with oak or fir plugs .... add	...		0	1	0	1	0	1
226. If fixed with wrought copper nails .... add	...		0	0½	0	0½	0	0½
227. If jointed and pitched on one side as to gutters .... add	...		0	1	0	1	0	1

TABLE V.—*continued.*

Prices for Timber and Carpenters' Work.

Curved work, bent in fixing, to be charged one and one-fourth the price of straight. Curved face, as to cylinders, &c., to be charged one and a half more than straight. Curved on plan to be charged twice the price of straight. Curved work, glued up in thicknesses, to be charged three times the price of straight.

WAINSCOT.

Straight or raking, including glue joints or beading where necessary, fixing and nails, and applying to every description of work not particularly specified.

	PER FOOT SUPER.							
	1¼ inch.		1½ inch.		2 inch.		2½ inch.	
	s.	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*
Rough	1	0						
Edges shot.........................	1	1½						
Wrought one side, edges shot ...	1	2¼						
Wrought both sides, edges shot	1	3						
Wrought one side, and framed or clamped	1	6						
Wrought both sides, and framed or clamped	1	6¼						
Wrought one side and dovetailed	1	6						
Wrought both sides and dovetailed	1	7						
If ploughed and tongued, or rebated joints .... add	0	1½						
For deal, oak, or wainscoat put together with white-lead, add	0	1	0	1	0	1	0	1
If plugged to walls with oak or fir plugs .... add	0	0½	0	0½	0	0¾	0	0¾
If fixed with wrought copper nails .... add	0	1	0	1				
If jointed and pitched on one side as to gutters .... add	0	1	0	1	0	1	0	1¼

TABLE V.—*continued.*

Prices for Timber and Carpenter's Work.

OAK FILLETS and Oak in narrow widths, prepared and fixed, all complete.	PER YARD LINEAL.					
	½ inch.		¾ inch.		1 inch.	
	s.	*d.*	*s.*	*d.*	*s.*	*d.*
228. Two inches wide and under, rough	0	3	0	3¾	0	4½
229. Ditto, wrought	0	4½	0	5¼	0	6
230. Ditto, wrought, beaded or chamfered on one angle	0	6	0	6¾	0	7½
231. Ditto, wrought, beaded or chamfered on both angles	0	6¾	0	7½	0	8¼
232. Ditto, wrought, and rounded on one edge	0	6½	0	7½	0	8¼
233. Ditto, wrought, and rounded on both edges	0	7½	0	9	0	10½
234. Three inches wide and under, rough	0	4½	0	5¼	0	6
235. Ditto, wrought	0	6	0	6¾	0	8¼
236. Ditto, wrought, and beaded or chamfered on one angle	0	7½	0	8¼	0	9¾
237. Ditto, wrought, and beaded or chamfered on two angles	0	8¼	0	9	0	11¼
238. Ditto, wrought, and rounded on one edge	0	7½	0	9	0	10½
239. Ditto, wrought, and rounded on both edges	0	9	0	10½	1	0¾
ELM FILLETS.						
240. Two inches wide and under, rough	0	1½	0	2¼	0	3
241. Ditto, wrought	0	3	0	3¾	0	4½
242. Ditto, and beaded or chamfered on one angle	0	4½	0	5¼	0	6
243. Three inches wide and under, rough	0	2¼	0	3	0	4½
244. Ditto, wrought	0	3¾	0	4½	0	6
245. Ditto, and beaded or chamfered on one angle	0	5¼	0	6	0	7½

TABLE V.—*continued.*

Prices for Timber and Carpenter's Work.

OAK FILLETS and Oak in narrow width, prepared and fixed, all complete.	PER YARD LINEAL.					
	1¼ inch.		1½ inch.		2 inch.	
	s.	*d.*	*s.*	*d.*	*s.*	*d.*
Two inches wide and under, rough	0	5¼	0	6	0	6¾
Ditto, wrought	0	6¾	0	8¼	0	9
Ditto, wrought, beaded or chamfered on one angle..................................	0	8¼	0	9¾	0	10½
Ditto, wrought, beaded or chamfered on both angles	0	9	0	10½	1	0
Ditto, wrought, and rounded on one edge	0	9	0	10½	0	11¼
Ditto, wrought, and rounded on both edges	0	11¼	1	0¾	1	2¼
Three inches wide and under, rough......	0	7½	0	9	0	10½
Ditto, wrought	0	9¾	0	11¼	1	0¾
Ditto, wrought, and beaded or chamfered on one angle	0	11¼	1	0¾	1	2¼
Ditto, wrought, and beaded or chamfered on two angles............................	1	0¾	1	2¼	1	3¾
Ditto, wrought and rounded on one edge	1	0	1	1½	1	3¾
Ditto, wrought, and rounded on both edges	1	2¼	1	3¾	1	6
ELM FILLETS.						
Two inches wide and under, rough	0	3¾	0	4½	0	5¼
Ditto, wrought	0	5	0	6	0	6¾
Ditto, and beaded or chamfered on one angle	0	6¾	0	7½	0	8¼
Three inches wide and under, rough......	0	5¼	0	6	0	6¾
Ditto, wrought	0	6¾	0	7½	0	9
Ditto, and beaded or chamfered on one angle	0	8¼	0	9	0	10½

TABLE V.—*continued.*

Prices for Timber and Carpenter's Work.

DEAL FLOORS PREPARED FROM DEAL WIDTHS.

Laid complete, with wrought iron clasp nails, including half spaces and landings of stairs; nett quantities only in admeasurements, and no allowance for extras.

	PER SQUARE.							
	¾ inch.		1 inch.		1¼ inch.		1½ inch.	
	Nails 15 lbs. per 1000.		Nails 20 lbs. per 1000.		Nails 25 lbs. per 1000.		Nails 30 lbs. per 1000.	
WITH BROKEN JOINTS.	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*
246. Rough, edges shot and fillistered	25	6	31	6	37	6	44	0
247. Wrought, ditto	28	0	34	0	40	0	46	6
248. Ditto, rebated and fillistered	...		...		45	0	53	0
249. Ditto, tongued with hoop iron	...		...		45	6	53	6
STRAIGHT JOINTS AND TONGUED HEADINGS.								
250. Wrought, edges shot and fillistered..........................	..		35	6	41	6	48	6
251. Ditto, and ploughed and tongued, or rebated and filletted	...		...		46	6	55	0
252. Wrought and tongued with hoop iron..........................	...		...		47	0	55	6
253. If copper nails .... add	. .		6	6	9	0	12	0
254. If oak treenails .... add	...		...		5	0	6	0
PREPARED FROM BATTEN WIDTHS, WITH BROKEN JOINTS.								
255. Wrought, edges shot and fillistered..........................	29	0	35	0	41	6	48	6
256. Ditto, rebated and filletted	...		...		48	6	57	0
257. Ditto, and tongued with hoop iron	...		...		49	6	58	0
STRAIGHT JOINTS AND TONGUED HEADINGS.								
258. Wrought, edges shot and fillistered..........................	...		37	0	43	6	50	6
259. Ditto, and ploughed and tongued or rebated and filletted	...		...		50	6	59	0
260. Ditto, and tongued with hoop iron	...		...		51	6	60	0

TABLE IV.—*continued.*

Prices for Timber and Carpenter's Work.

DEAL FLOORS PREPARED FROM DEAL WIDTHS.

Laid complete, with wrought iron clasp nails, including half spaces and landings of stairs; nett quantities only in admeasurements, and no allowance for extras.	PER SQUARE.					
	2 inch.		2½ inch.		3 inch.	
	Nails 40 lbs. per 1000.		Nails 60 lbs. per 1000.		Nails 80 lbs. per 1000.	
WITH BROKEN JOINTS.	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*
Rough, edges shot and fillistered......	56	0	68	0	79	0
Wrought, ditto........................	59	0	71	0	82	0
Ditto, rebated and fillistered	65	6	78	6	90	0
Ditto, tongued with hoop iron.........	66	6	79	6	91	0
STRAIGHT JOINTS AND TONGUED HEADINGS.						
Wrought, edges shot and fillistered...	61	0	73	6	85	6
Ditto, and ploughed and tongued, or rebated and filletted	67	6	81	6	93	6
Wrought and tongued with hoop iron	68	6	82	6	94	6
If oak treenails .... add	7	0	8	6	10	0
PREPARED FROM BATTEN WIDTHS, WITH BROKEN JOINTS.						
Wrought, edges shot and fillistered ...	61	0	73	6	85	0
Ditto, rebated and filletted	70	0	83	6	96	0
Ditto, and tongued with hoop iron ...	71	6	85	0	97	6
STRAIGHT JOINTS AND TONGUED HEADINGS.						
Wrought, edges shot and fillistered...	64	0	77	6	89	6
Ditto, and ploughed or tongued, or rebated and filletted	73	0	87	6	100	6
Ditto, and tongued with hoop iron ...	74	6	89	0	102	0

TABLE V.—*continued.*

Prices for Timber and Carpenter's Work.

OAK FLOORS.

	PER SQUARE.				
	1 inch.	1¼ inch.	1½ inch.	2 inch.	2½ inch.
WITH BROKEN JOINTS.	Nails 25 lbs. per 1000.	Nails 32 lbs. per 1000.	Nails 40 lbs. per 1000.	Nails 50 lbs. per 1000.	Nails 70 lbs. per 1000.
	s. d.	*s. d.*	*s. d.*	*s. d.*	*s. d.*
261. Rough, edges shot and fillistered............	64 0	77 0	90 0	115 0	141 0
262. Wrought ditto......	68 0	81 0	94 0	119 6	145 0
263. Wrought, rebated, and filletted	...	90 0	104 0	130 0	157 0
STRAIGHT JOINTS AND TONGUED HEADINGS.					
264. Wrought, edges shot and fillistered............	70 0	84 0	97 0	123 0	150 0
265. Ditto, and ploughed and tongued, or rebated and filletted	...	93 0	107 0	134 0	162 0
266. If oak treenails instead of iron nails, add	...	6 0	7 0	8 6	10 0

In floors of 1¼ inch thick and upwards, the floors must be compressed to their situations at every third board, by dogs or patent levers.

TABLE V.—*continued.*

Prices for Timber and Carpenter's Work.

WAINSCOT AND DEAL FILLETS, Or Wainscot and Fir in narrow widths, prepared and fixed all complete.	WAINSCOAT PER YARD LINEAL.											
	¼ inch.		½ inch.		¾ inch.		1 inch.		1¼ inch.		1½ inch.	
	s.	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*
267. Two inches wide and under, rough	0	3	0	3¾	0	4½	0	5¼	0	6¾	0	7¼
268. Ditto ditto, wrought	0	4½	0	5¼	0	6	0	7½	0	9	0	10½
269. Ditto ditto, beaded or chamfered on one angle ...	0	6	0	6¾	0	7½	0	9	0	10½	1	0
270. Ditto ditto, beaded or chamfered on both angles	0	6¾	0	7½	0	8¼	0	9¾	0	11¼	1	1½
271. Ditto ditto, wrought and rounded on one edge...	0	6	0	6¾	0	8¼	0	9¾	0	11¼	1	3
272. Ditto ditto, wrought and rounded on both edges	0	6¾	0	8¼	0	9¼	1	0	1	1½	1	4½
273. Two inches wide and not exceeding three, rough......	0	3¾	0	5¼	0	6¾	0	7½	0	9	0	10½
274. Ditto ditto, wrought	0	5¼	0	6¾	0	8¼	0	9¾	0	11¼	1	0
275. Ditto ditto, beaded or chamfered on one angle ...	0	6¾	0	8¼	0	9¼	0	11¼	1	0¾	1	1½
276. Ditto ditto, beaded or chamfered on both angles	0	7½	0	9	0	10½	1	0	1	1½	1	3
277. Ditto ditto, wrought and rounded on one edge...	0	6¼	0	8¼	0	10½	1	0	1	1½	1	4½
278. Ditto ditto, wrought and rounded on both edges	0	7½	0	9¾	1	0	1	2¼	1	3¾	1	6
279. For fillets plugged to wall, add per yard lineal 1½*d.*												

TABLE V.—*continued.*

Prices for Timber and Carpenter's Work.

WAINSCOT AND DEAL FILLETS,

Or Wainscot and Fir in narrow widths, prepared and fixed all complete.

	DEAL PER YARD LINEAL.											
	½ inch.		¾ inch.		1 inch.		1¼ inch		1½ inch.		2 inch.	
	s.	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*
Two inches wide and under, rough	0	1½	0	2¼	0	3	0	3¼	0	3¾	0	4½
Ditto ditto, wrought	0	3	0	3¾	0	4½	0	4¾	0	5¼	0	6
Ditto ditto, beaded or chamfered on one angle	0	3¾	0	4½	0	5¼	0	5½	0	6	0	6¾
Ditto ditto, beaded or chamfered on both angles	0	4½	0	5¼	0	6	0	6¼	0	6¾	0	7½
Ditto ditto, wrought and rounded on one edge	0	3¾	0	5¼	0	6	0	6¼	0	6¾	0	7½
Ditto ditto, wrought and rounded on both edges	0	4½	0	6	0	6¾	0	7½	0	8¼	0	9
Two inches wide and not exceeding three, rough	0	2¼	0	3	0	3¾	0	4½	0	5¼	0	6
Ditto ditto, wrought	0	3¾	0	4½	0	5¼	0	6	0	6¾	0	8¼
Ditto ditto, beaded or chamfered on one angle	0	4½	0	5¼	0	6	0	6¾	0	7½	0	9
Ditto ditto, beaded or chamfered on both angles	0	5¼	0	6	0	6¾	0	7½	0	8¼	0	9¾
Ditto ditto, wrought and rounded on one edge	0	4½	0	6	0	6¾	0	7½	0	8¼	0	9¾
Ditto ditto, wrought and rounded on both edges	0	5¼	0	6¾	0	7½	0	9	0	9¾	0	11¼

For fillets plugged to wall, add per yard lineal 1½*d.*

TABLE V.—*continued.*

Prices for Timber and Carpenter's Work.

Gates, Doors, and Flaps, Ledged.

DEAL AND OAK.

The edges and ends of the ledges to be chamfered, and in wrought doors the boards to be beaded. Up to 1½ inch thick the ledges to be of the same thickness as the doors, and beyond that thickness ½ an inch less than the thickness of the doors. The boards not exceeding six inches wide.

	PER FOOT SUPER.					
	DEAL.					
	¾ inch.		1 inch.		1¼ inch.	
	s.	d.	s.	d.	s.	d.
280. Rough	0	4½	0	5	0	6
281. Edges shot	0	5	0	6	0	7
282. If braced	0	5¾	0	7	0	7¼
283. Wrought	0	6	0	7¼	0	8½
284. Ditto, and ploughed and tongued, or rebated	0	6¾	0	8	0	9½
285. If braced	0	8	0	9¼	0	11
286. If hung, add per super foot	0	0¾	0	0¾	0	0¾
287. If in two leaves „ „	0	1	0	1	0	1
288. If in two heights „ „	0	1	0	1	0	1

	PER FOOT SUPER.					
	DEAL.					
	1½ inch.		2 inch.		1½ inch.	
	s.	d.	s.	d.	s.	d.
Rough	0	7	0	8½	1	2
Edges shot	0	8	0	9¾	1	4
If braced	0	9½	0	11½	1	6½
Wrought	0	9½	0	11¼	1	5¾
Ditto, and ploughed and tongued, or rebated	0	10¾	1	0½	1	7¾
If braced	1	0½	1	2	1	11
If hung, add per super foot	0	1	0	1¼	0	1
If in two leaves „ „	0	1	0	1	0	1½
If in two heights „ „	0	1	0	1½	0	1¾

Curved heads to be measured nett, and to be paid for at twice the price of the straight.

TABLE V.—*continued.*

Prices for Timber and Carpenter's Work.

DEAL DOORS AND GATES, WROUGHT AND FRAMED IN PANELS, INCLUDING HANGING.	PER FOOT SUPER.					
	1¼ inch.		1½ inch.		.2 inch.	
	s.	*d.*	*s.*	*d.*	*s.*	*d.*
289. One or two panel, square and flat...	0	8	0	9	0	11
290. Ditto, flush, square and flat	0	9	0	10	1	9
291. Ditto,* ditto, both sides	0	10	1	0	1	2
292. Four panel, square and flat	0	8	0	9	0	11
293. Ditto, flush, square and flat	0	10	0	11	1	1
294. Ditto,* ditto, both sides	...		1	0	1	2
295. Six panel, square and flat............	...		0	11	1	1
296. Ditto, flush, square and flat	...		1	0	1	2
297. Ditto,* ditto, both sides	...		1	1	1	3
298. Hung in two leaves, or for double margins separated by a bead, 2 or 4 panel, and the opening not exceeding 30 super ft. ....add per sup. foot	0	1	0	1	0	1
299. Ditto, ditto, 6 panel ditto, add „	...		0	1½	0	1½
For square framing moulded—						
300. One or two panels, for each side add	0	1	0	1	0	1
301. Four ditto ditto add	0	1	0	1	0	1
302. Six ditto ditto add	0	1	0	1½	0	1½
303. For each face of one, two or four panels, flush doors, add, if bead butt, per foot super, ¼*d.*						
304. Ditto, if bead flush, add per foot super ½*d.* Beads to be worked on framing of bead flush doors.						
Ditto, ditto, ditto, six panels—						
305. Bead butt, add per super foot, ½*d.*						
306. Bead butt, add per super foot, 1*d.*						
307. Four panel, bead butt or flush at bottom and moulded and flat at the top, square and flat at the back	...		1	0	1	1
308. Six panel, ditto, ditto, ditto.........	...		1	1	1	2
309. Four panel, bead butt or flush at bottom raised panel at top, square and flat at the back	...		1	1	1	3
310. Six panel, ditto, ditto, ditto.........	...		1	2	1	4

Curved heads to be measured nett, and to be paid for at twice the price for the straight.

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* To include solid panels, if required, and joints ploughed, feather-tongued, and glued.

TABLE V.—*continued.*

Prices for Timber and Carpenter's Work.

DEAL DOORS AND GATES, WROUGHT AND FRAMED IN PANELS, INCLUDING HANGING.	PER FOOT SUPER.			
	2½ inch.		3 inch.	
	s.	*d.*	*s.*	*d.*
Four panel, square and flat	1	1	1	3
Ditto, flush, square and flat	1	3	1	5
Ditto,* ditto, both sides..............................	1	5	1	7
Six panel, square and flat	1	3	1	5
Ditto, flush, square and flat	1	4	1	7
Ditto,* ditto, both sides..............................	1	6	1	8
Hung in two leaves, or for double margins separated by a bead, 2 or 4 panel, and the opening not exceeding 30 super feet, add per foot super	0	1½	0	2
Ditto, ditto, 6 panel ditto add ,,	0	1½	0	2
For square framing moulded—				
One or two panels, for each side, add ,,	0	1½	0	2
Four ditto ditto add ,,	0	2	0	2
Six ditto ditto add ,,	0	2	0	2½
For each face of one, two or four panels, flush doors, add, if bead butt, per foot super, ¼*d.*				
Ditto, if bead flush, add per foot super, ½*d.* Beads to be worked on framing of bead flush doors.				
Ditto, ditto, ditto, 6 panels—				
Bead butt, add per super foot, ½*d.*				
Bead butt, add per super foot, 1*d.*				
Four-panel, bead butt or flush at bottom and moulded and flat at the top, square and flat at the back	1	3	1	5
Six-panel, ditto, ditto, ditto	1	4	1	6
Four-panel, bead butt or flush at bottom, raised panel at top, square and flat at the back	1	5	1	7
Six-panel, ditto, ditto, ditto	1	6	1	8

Curved heads to be measured nett, and to be paid for at twice the price for the straight.

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* To include solid panels if required, and joints ploughed, feather-tongued, and glued.

TABLE V.—*continued.*

Prices for Timber and Carpenter's Work.

	OAK,							
	PER FOOT SUPER.							
GATES AND DOORS FRAMED AND BRACED, WITH MARGINS NOT LESS THAN 6 INCHES WIDE, INCLUDING HANGING.	2 inch, filled in with 1 in. plank.		2½ inch. filled in with 1¼ in. plank.		3 inch, filled in with 1½ in. plank.		4 inch, filled in with 2 in. plank.	
	s.	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*
311. Wrought, rebated, & beaded	1	9	2	0	2	4	3	0
312. Wrought, herring-boned, and solid at back	2	0	2	4	2	9	3	9
313. Prepared and hung folding	2	2	2	6½	3	0	4	1
314. Put together with white lead	2	2½	2	7½	3	1	4	2
315. If prepared with wicket, each wicket	12	0	14	0	15	0	17	0

	DEAL,									
	PER FOOT SUPER.									
	1½ inch, filled in with ¾ in. battens.		2 inch, filled in with 1 in. battens.		2½ inch, filled in with 1¼ in. battens.		3 inch, filled in with 1½ in. battens.		4 inch, filled in with 2 in. battens.	
	s.	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*
Wrought, rebated, and beaded	0	10	1	0	1	2	1	4	1	9
Wrought, herring-boned, and solid at back	1	11	1	2	1	4	1	7	2	1
Prepared and hung folding	1	0	1	3	1	6	1	9	2	3
Put together with white lead	1	0½	1	3½	1	7	1	10	2	4
If prepared with wicket, each wicket	6	0	7	0	8	0	9	0	11	0

ARCHITRAVES.

	DEAL.	
	s.	*d.*
316. Single, above 2½ inches in girth ...... per foot super	0	8
317. Ditto ditto ditto circular on plan per foot super	1	3
318. Ditto ditto ditto circular doors and window frames.................................per foot super	1	7

319. Double architraves to be girted and taken as mouldings.

TABLE V.—*continued.*

BATTENING TO WALLS.

The battens to be measured nett and separately. Plugs of 1 inch deal, 6 inches long and 2¼ wide.

PER FOOT SUPER.

	¾ inch deal fixed with		1 inch deal fixed with		1¼ inch deal fixed with		1½ inch deal fixed with	
	Plugs.	Wall hooks or nails to wood or brick.	Plugs.	Wall hooks.	Plugs.	Wall hooks.	Plugs.	Wall hooks.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
320. Straight..............	0 6	0 5	0 7	0 6	0 8	0 7	0 10	0 8
321. Curved on plan......	0 7	0 5½	0 8	0 7	0 9	0 8	0 11	0 9

For ¾ inch battens, wall hooks to be 5 inches long and 7 to the lb.
For 1 and 1¼ inch battens, wall hooks to be 6 inches long and 5 to the lb.
For 1½ inch battens, wall hooks to be 7 inches long and 4 to the lb.

BATTENING TO SLATES.

		¾ inch.		1 inch.		1½ inch.
		s. d.		s. d.		s. d.
322. Deal.........................	per yard super	3 0	......	3 6	......	4 0

TABLE V.—*continued.*

Prices for Timber and Carpenter's Work.

DEAL JAMBS AND SOFFITS, FIXED COMPLETE.

	PER FOOT SUPER.					
	¾ inch.		1 inch.		1¼ inch.	
	s.	d.	s.	d.	s.	d.
322. Plain	0	4	0	5	0	6
323. Single rebated	...		0	6	0	7
324. Double rebated	...		0	6¾	0	7½
325. Framed square and flat in one or two panels in height	...		0	7	0	8
326. Ditto, ditto, and rebated one edge	...		0	7	0	8
327. Ditto, ditto, and rebated two edges	...		0	8	0	9
328. If as in last three Items and moulded	...		0	9	0	10
329. Framed square and flat in three or four panels in height	...		0	7	0	8
330. Ditto, ditto, and rebated one edge	...		0	7¾	0	8¾
331. Ditto, ditto, and rebated two edges	...		0	8	0	9
332. If as in last three Items, and moulded	...		0	9	0	10

	1½ inch.		2 inch.		2½ inch.	
	s.	d.	s.	d.	s.	d.
Plain	0	7	0	9	0	11
Single rebated	0	8	0	9¾	1	0
Double rebated	0	8½	0	10	1	0½
Framed square and flat in one or two panels in height	0	9	0	10½	...	
Ditto, ditto, and rebated one edge	0	9	0	11	...	
Ditto, ditto, and rebated two edges	0	10	1	0	...	
If as in last three Items and moulded	0	11½	1	1	...	
Framed square and flat in three or four panels in height	0	9	0	11	...	
Ditto, ditto, and rebated one edge	0	9¾	0	11½	...	
Ditto, ditto, and rebated two edges	0	10	1	0	...	
If as in last three Items, and moulded	0	11	1	1½	...	

TABLE V.—*continued.*

Prices for Timber and Carpenter's Work.

DADO.	1 inch deal.		1¼ inch deal.	
	s.	*d.*	*s.*	*d.*
333. Level, ploughed and tongued heading joints glued up, and keyed and grooved at internal angles ....per foot super	0	7½	0	9
334. Raking, ploughed and tongued heading joints glued up, and keyed, including ramps per foot super	0	10	1	1

DEAL MOULDINGS, Including double-faced architraves.	Straight.		Curved on straight plans, or straight on curved plan.	
	s.	*d.*	*s.*	*d.*
335. Above 2½ inches in girth ...per foot super	0	10	1	9
336. Under 2½ inches in girth ......per foot run	0	2	...	
OAK MOULDINGS, Including double-faced architraves.				
337. Above 2½ inches in girth ...per foot super	1	2	2	0
338. Under 2½ inches in girth ......per foot run	0	3	...	

TABLE V.—*continued.*

Prices for Timber and Carpenter's Work.

DEAL CASED SASH FRAMES.

	s.	*d.*
339. Prepared for 1½ sash frames, oak sills, inch deal outside and ¾-inch inside linings, two-inch heads, 1¼-inch pulleys, tongued to linings, ⅜-inch parting beads, ½-inch back linings and parting slips; inside beads 1¼-inch wide × ¾ thick, single or double hung, exclusive of pulleys, but including the fixing......... per foot super	0	7
340. Prepared for 2-inch sashes, with ditto, ditto, ditto, but with 1-inch inside linings and 1½-inch wide inside beads per foot super	0	8
341. If with wainscot pulley pieces ... add „	0	1½
342. If with wainscot beads .... add „	0	0½

	OAK.			DEAL.	
	s.	*d.*		*s.*	*d.*
343. Solid frames, common or transom, 4½ inches by 3½ inches, deal parting beads, slip or weather beads, ¾ inch outside linings and inside beads, oak-weathered and rebated sills..................... per foot super	1	0	......	0	8
344 Ditto, ditto, ditto, 5½ inches by 3½ inches..........................per foot super	1	2	......	0	8¾
The superficial quantities in semicircular or segmental heads, to be paid for at twice the above rates.					
345. Solid circular frames, wrought and chamfered, with proper deal beds and linings (to be measured square to the diameter of the circle, or mean diameter for elliptical curve) per foot super	2	8	......	1	9

N.B. The exterior height and width of the sash frame to determine the superficial quantity.

TABLE V.—*continued.*

Prices for Timber and Carpenter's Work.

SASHES. Fixed or hung with hinges or pivots, but exclusive of the price of hinges or pivots.	PER FOOT SUPER.			
	1½-inch Deal.		2-inch Deal.	
	Straight.	Circular or curved head.	Straight.	Circular or curved head.
	s. *d.*	*s* *d.*	*s.* *d.*	*s.* *d.*
346. Square bar	0 5	0 8	0 6	0 10
347. Moulded or bevelled bar...	0 6	0 10	7 0	1 0
348. If hung in frames, with line and iron weights, but ex-exclusive of the price of lines and weights, add per foot super	0 2½	0 2½	0 2½	0 2½

Circular, segmental, or other curved sashes to be squared by taking the greatest heights and widths.

SOUND BOARDING, PER SQUARE, INCLUDING FILLETS.

	s.	*d.*
349. Of not less than ¾-inch deal	30	6
350. Ditto ditto edges shot	32	6

WEATHER BOARDING, Per square, with 1¼-inch laps.	Rough.	Wrought one side.	Wrought both sides.
	s. *d.*	*s.* *d.*	*s.* *d.*
351. Three-quarter inch deal...	23 6	26 6	29 6
352. Battens	26 0	30 0	33 0
353. If copper nails are used, add per square	3 8	3 8	3 8

WEATHER BOARDING, Per square, with 1¼-inch laps.	Wrought one side and chamfered.	Wrought both sides & chamfered.	Wrought both sides & rebated.
	s. *d.*	*s.* *d.*	*s.* *d.*
Three-quarter inch deal	28 6	31 6	32 6
Battens.............................	32 6	34 6	36 6
If copper nails are used, add per square	3 8	3 8	3 8

TABLE V.—*continued.*

Prices for Timber and Carpenter's Work.

	PER FOOT SUPER.							
	OAK.							
STAIRCASES.	1 inch.		1¼ inch.		1½ inch.		2 inch.	
	s.	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*
354. Rough steps and risers, edges shot	1	2	1	4	1	6	1	10
355. Wrought steps and risers, with rounded nosings	1	4	1	6	1	8	2	0
356. Wrought, glued and blocked, with rounded nosings	1	5½	1	8	1	10	2	3
357. Wrought, glued and blocked, with rounded nosings, and moulded	1	7	1	9½	2	0	2	5
358. If steps are dovetailed for balusters add	0	1½	0	1½	0	1½	0	1½
359. With risers, one edge tongued into treads add	0	1	0	1	0	1½	0	2
360. With both edges tongued into treads add	0	2	0	2	0	3	0	4
361. With steps and risers squared at one end and fitted into string add	0	0¾	0	0¾	0	1	0	1¼
362. Ditto, ditto at both ends, add	0	1½	0	1½	0	2	0	2½
363. Circular at one end and fitted into string add	0	1½	0	1½	0	2	0	2½
364. Circular at both ends and fitted into string add	0	3	0	3	0	4	0	5

365. Return, moulded nosings to ends of steps, per ft. run	1	0
366. Ditto ditto ditto circular „	2	4

TABLE V.—*continued.*

Prices for Timber and Carpenter's Work.

	PER FOOT SUPER.							
	DEAL.							
STAIRCASES.	1 inch.		1¼ inch.		1½ inch.		2 inch.	
	s.	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*
Rough steps and risers, edges shot	0	7	0	8	0		0	11
Wrought steps and risers, with rounded nosings..................	0	8	0	9	0	10	1	0
Wrought, glued and blocked, with rounded nosings..................	0	9¼	0	10½	1	0	1	2
Wrought, glued and blocked, with rounded nosings, and moulded	0	10½	1	0	1	2	1	4
If steps are dovetailed for balusters .... add	0	1	0	1	0	1	0	1
With risers, one edge tongued into treads .... add	0	0¾	0	0¾	0	1	0	1
With both edges tongued into treads .... add	0	1½	0	1½	0	2	0	2
With steps and risers squared at one end and fitted into string add	0	0½	0	0½	0	1	0	1
Ditto, ditto, at both ends ... add	0	1	0	1	0	1½	0	1½
Circular at one end and fitted into string .... add	0	1	0	1	0	1½	0	1½
Circular at both ends and fitted into string .... add	0	2	0	2	0	3	0	3

Return, moulded nosing to ends of steps, per foot run...	0	8
Ditto ditto ditto circular „ ...	1	6

TABLE V.—*continued.*

Prices for Timber and Carpenter's Work.

DEAL PARTITIONS.	PER FOOT SUPER.					
	1 inch.		1¼ inch.		1½ inch.	
	s.	*d.*	*s.*	*d.*	*s.*	*d.*
367. Framed square and flat panel	0	7	0	8	0	8¾
368. Ditto, left rough on one side	0	6	0	7	0	7½
369. Ditto, moulded on one side	0	8	0	9	0	9¾
370. Bead and butt, or bead and flush square and flat panel	0	8	0	9	0	10½
371. Ditto, left rough on one side	0	7	0	8	0	9½
372. Ditto, moulded on the back	0	8	0	9	0	10½
373. Bead and butt, or bead and butt on both sides	...		0	11	1	0

DEAL PARTITIONS.	PER FOOT SUPER.			
	2 inch.		2½ inch.	
	s.	*d.*	*s.*	*d.*
Framed square and flat panel........................	0	10	1	0
Ditto, left rough on one side	0	8¾	0	10½
Ditto, moulded on one side...........................	0	10	1	0
Bead and butt, or bead and flush, square and flat panel	1	1	1	2
Ditto, left rough on one side	1	0	1	0½
Ditto, moulded on the back	1	1	1	2
Bead and butt, or bead and butt on both sides ..	1	2	1	4

TABLE V.—*continued.*

Prices for Timber and Carpenter's Work.

STAIRS.

DEAL STRING BOARDS.

The superficial quantity of any circular part of a string to be allowed for twice the following prices:—

	PER FOOT SUPER.					
	1 inch.		1¼ inch.		1½ inch.	
	s.	*d.*	*s.*	*d.*	*s.*	*d.*
374. Rough	0	4	0	5	0	6
375. Ditto, framed	0	5	0	6½	0	7½
376. Wrought one side	0	5½	0	6½	0	7½
377. Ditto and framed	0	6½	0	7½	0	8½
378. Wrought two sides	0	6¼	0	7	0	8
379. Wrought and framed	0	7¼	0	8¼	0	9¼
380. If scored	0	9	0	10	0	11
381. If moulded	0	8	0	8¼	0	10¼
382. If cut for steps and risers	0	9	0	10¼	0	11¼
383. Mitred and ditto, ditto	0	11	1	0½	1	1½

STAIRS.

DEAL STRING BOARDS.

The superficial quantity of any circular part of a string to be allowed for twice the following prices:—

	PER FOOT SUPER.					
	2 inch.		2½ inch.		3 inch.	
	s.	*d.*	*s.*	*d.*	*s.*	*d.*
Rough	0	7½	0	9	0	10
Ditto, framed	0	9	0	10½	1	0¼
Wrought one side	0	9	0	11	1	0½
Ditto and framed	0	10½	1	0	1	2
Wrought two sides	0	10	0	11½	1	1½
Wrought and framed	0	11	1	0¾	1	3
If scored	1	1	1	2	1	5
If moulded	1	0	1	2	1	4
If cut for steps and risers	1	1	1	3	1	5
Mitred and ditto, ditto	1	3	1	5	1	7

TABLE V.—*continued.*

Prices for Timber and Carpenter's Work.

	PER FOOT RUN.					
HANDRAILS, INCLUDING SINKING FOR BALUSTERS.	Honduras Mahogany.		Oak.		Deal.	
	s.	d.	s.	d.	s.	d.
384. Averaging 2½ × 2½ inches, rounded only	1	0½	0	10	0	6
385. Ditto, ditto, moulded	1	4½	1	1½	0	9
386. Ditto, 3 × 3 inches, rounded	1	4½	0	11½	0	8
387. Ditto, ditto, moulded	1	8½	1	3½	0	10
388. Ramps and knees, or circular, or elliptical on plan, averaging 2½ × 2½ inches, moulded	5	0	3	0	2	9
389. Wreathed or twisted, averaging 2½ × 2½ inches, moulded	10	9	9	3	5	10
390. Ramps and knees, circular or elliptical on plan, averaging 3 × 3 inches, moulded	5	10	4	8	3	0
391. Wreathed or twisted, averaging 3 × 3 inches, moulded	12	3	10	9	6	8
392. Framed, level, or raking, averaging above 3 × 3 inches, moulded per foot cube	...		14	0	8	6
NEWELS.						
393. Wrought and framed, level or raking, averaging 2½ × 2½ inches per foot run	...		0	8	0	5
394. Wrought and framed, level or raking, averaging 3 × 3 inches ......per ft. run	...		0	10	0	6
395. Wrought and framed, level or raking, above 3 × 3 in....per foot cube	...		0	12	0	7
396. Mitred and rounded tops, per ft. run	...		0	6	0	4
BALUSTERS.						
397. Averaging 1½ inch ... per foot run	...		0	4	0	2½
398. Ditto 1¼ „ ... „	...		0	3	0	2
399. Ditto 1 „ ... „	...		0	2¾	0	1¾
400. Ditto ¾ „ ... „	...		0	2¼	0	1½
401. Turning balusters add „	...		0	7	0	5
402. Turned pendants „ „	0	4	0	4	0	3
403. Ditto caps „ „	1	0	1	0	0	9

TABLE VI.

PRICES FOR WROUGHT IRON WORK.

	£	s.	d.
1. Girders and joists of rivetted plate and angle iron, not exceeding 20 feet in length, fixed ...... per cwt.	0	13	0
2. Ditto, not exceeding 40 feet in length, fixed „	0	15	0
3. Ditto, not exceeding 60 feet in length, fixed „	0	17	0
4. Ditto, not exceeding 100 ft. in length, fixed „	1	0	0
5. Wrought iron trusses, with bolts and nuts in iron roofs, exclusive of any cast iron, fixed......per cwt.	0	17	0
6. Purlins and rafters of angle or T-iron, fixed „	0	14	10
7. Tie-rods, screwed and fitted, fixed ... „ „	0	15	0
8. Sheet iron covering, including all necessary bolts, screws, and rivets, fixed, No. 12 to No. 20 gauge per cwt.	0	14	0
9. Ditto, ditto, fixed, No. 21 to No. 24 gauge, per cwt.	0	16	0
10. Add if corrugated, fixed .... „	0	3	0
11. Add if corrugated and curved, fixed ...... „	0	4	6
12. Sheet iron as above, galvanized, No. 12 to No. 14 per cwt.	1	0	0
13. Ditto ditto ditto No. 15 to No. 17 per cwt.	1	2	0
14. Ditto ditto ditto No. 18 to No. 20 per cwt.	1	4	6
15. Ditto ditto ditto No. 21 to No. 24 per cwt.	1	8	6
16. Ditto ditto ditto No. 25 to No. 27 per cwt.	1	12	6
17. Add to last five items, if corrugated and fixed „	0	5	0
18. Ditto ditto if corrugated, curved, and fixed .... per cwt.	0	7	0
19. Add to any of the above sheet irons in covering to doors and shutters, nailed with clout nails...per cwt.	0	2	6
20. Shoes, straps, and rings for timber piles, including nails and staples, fixed complete .... per cwt.	1	0	0
21. Bolts, rivets, hooks, or rings, under 2 lbs. per lb.	0	0	3¼
22. Ditto ditto ditto over 2 lbs. and under 4 lbs.. per lb.	0	0	2¾
23. Ditto ditto ditto over 4 lbs. and under 8 lbs.. per lb.	0	0	2½
24. Ditto ditto ditto 8 lbs. and upwards per lb.	0	0	2¼

TABLE VI.—*continued.*

Prices for Wrought Iron Work.

		£	*s.*	*d.*
25. Screw bolts, with nuts and washers, under 1 lb.	per lb.	0	0	8
26. Ditto, ditto, ditto, over 1 lb. and under 2 lbs.	„	0	0	7
27. Ditto, ditto, ditto, over 2 lbs. and under 4 lbs.	„	0	0	6
28. Ditto, ditto, ditto, over 4 lbs. and under 8 lbs.	„	0	0	4½
29. Ditto, ditto, ditto, over 8 lbs.	„	0	0	3½
30. Straps for roofing, including screw bolts, gibs, and keys, fixed	per lb.	0	0	3½
31. Best best Staffordshire crown iron	per cwt.	0	11	0

	Under 1½ lbs.		1½ lbs. and under 3 lbs.		3 lbs. and under 7 lbs.		7 lbs. and under 28 lbs.		28 lbs. and upwards	
	s.	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*
32. Ditto, hammered only from anvil ...... per lb.	0	2½	0	2	0	1¾	0	1¼	0	1
33. Ditto, ditto, and reduced to size and pattern .... per lb.	0	3½	0	3	0	2¾	0	2¼	0	1¾
34. Ditto, hammered, reduced, and filed roughly per lb.	0	4½	0	3¾	0	3½	0	2¾	0	2
35. Add if drilled or punched .... per lb.	0	1	0	0¾	0	0½	0	0½	0	0¼
36. Add if screwed, as for bolts and nuts...per lb.	0	3	0	2¼	0	1¾	0	1¼	0	0¾
37. Welds, when ordered each	0	2	0	3	0	6	0	9	1	0

		s.	*d.*
38. Add if steel instead of iron	per lb.	0	3
39. Add if copper instead of iron	„	1	4

TABLE VI.—*continued.*

Prices for Wrought Iron Work.

			£	s.	d.
	Wrought iron rolled I girders, not exceeding 20 feet in length—				
40.	6 and 7 inches deep, and from 2 to 4 inches wide on the flanges	per ton	13	0	0
41.	8 in. deep and 5 inches wide on the flanges	„	13	10	0
42.	10 in. deep and ditto ditto	„	14	0	0
43.	12 in. deep and ditto ditto	„	14	10	0
44.	15 in. deep and 6 inches ditto ditto	„	15	5	0
45.	Add for the above six items when from 20 to 25 feet in length	„	0	10	0
46.	Ditto ditto from 25 to 30 feet lengths	„	1	0	0
	Wrought iron rolled H girders not exceeding 15 feet in length—				
47.	4 inches by 4 inches by 4 inches.........	per ton	14	10	0
48.	5 ditto 4½ ditto 4½ ditto.........	„	15	0	0
49.	5 ditto 5 ditto 5 ditto.........	„	15	0	0
50.	6 ditto 5 ditto 5 ditto.........	„	15	10	0
51.	6 ditto 6 ditto 6 ditto.........	„	16	0	0
52.	7 ditto 7 ditto 7 ditto.........	„	17	0	0
53.	Add for lengths from 15 to 20 feet.........	„	0	10	0
54.	Add ditto from 20 to 25 feet.........	„	1	5	0
55.	Add ditto from 25 to 30 feet.........	„	2	0	0
56.	Flitch plates under 30 feet long and not exceeding 12 inches wide, nor 1 inch thick, nor 4 cwt.	per ton	12	0	0
57.	Add for every ½ cwt. over 4 cwt. each plate		0	10	0
58.	Light joist bars from 4 to 8 inches deep,	per ton	12	10	0
59.	Add for lengths from 20 to 25 feet.........	„	0	10	0
60.	Add ditto from 25 to 30 feet.........	„	1	0	0

TABLE VII.

Specification of Cast Iron Pipes,

DESCRIBED ON PAGES 80, 81.

All pipes above 12 inches diameter to have wide sockets for lead joints; those of 12 inches diameter and less to have principally turned and bored joints; from 5 to 20 per cent. of each size, according to circumstances, having wide sockets.

All pipes with wide sockets above 4 inches in diameter to have ¾ of an inch for the joint; the pipes of 4, 3, and 2 inches in diameter to have ¼ of an inch for the joint.

The whole of the pipes to be subjected to hydrostatic pressure according to the following schedule, and each pipe, while under pressure, must be rapped with a hand hammer from end to end, so as to discover whether there are any sandy, porous, or blown places; the hammer to vary from 4 to 7 lbs. weight according to the size and strength of the casting.

The whole of the pipes to be cast vertically in dry sand moulds, and to be of uniform bore and uniform thickness of metal throughout, without any belts; the whole to be of the best grey metal, remelted from the cupola, and to be perfectly free from flaws and defects of every kind.

All pipes of 18 inches diameter and upwards to be cast with socket downwards; those below that size may be cast with socket upwards.

All pipes to be carefully coated inside and out with coal pitch and oil, according to Dr. Angus Smith's and M'Dougal's patent process. The coating to be applied at a proper heat and in a proper manner before rust sets in, and the operation to be performed under the inspection of a person appointed by the engineer of the company.

TABLE VII.—*continued.*

ESTIMATE OF THE WEIGHTS, WITH PROOF AND WORKING PRESSURES, FOR CAST IRON PIPES FOR WATERWORKS.

Diameter of pipe.	Length of each pipe.		Thickness of metal.	Depth of socket.	Mean weight of each pipe.			Permitted deviation in weight.	Proof pressure equal to a column of water of the following height.	Or pounds per square inch.	Maximum working pressure, equal to a column of water of the following height.
Inch.	Feet.	Inch.	Inch.	Inch.	Cwt.	qrs.	lbs.	Per cent.	Feet.	lbs.	Feet.
33	12	5	1	5	39	1	25	2	400	173	210
30	12	5	1¼	5	44	0	3	„	600	260	300
30	12	5	1	5	35	3	5	„	500	217	250
24	12	5	1	5	28	1	23	„	600	260	300
20	9	4½	7/8	4½	16	0	4	„	500	217	250
20	9	4½	3/4	4½	13	3	25	„	450	195	240
18	9	4½	13/16	4½	13	1	12	2½	600	260	300
18	9	4½	3/4	4½	12	1	19	„	500	217	250
18	9	4½	11/16	4½	11	1	27	„	450	195	230
16	9	4½	3/4	4½	10	3	27	„	600	260	300
16	9	4½	11/16	4½	10	0	18	„	500	217	250

16	9 4½	5/8	4½	9 1 9	,,	400	173	200
15	9 4½	11/16	4½	9 2 3	,,	500	217	250
15	9 4½	9/16	4½	7 3 25	,,	400	173	200
14	9 4½	11/16	4½	8 3 23	,,	600	260	290
14	9 4½	5/8	4½	8 0 25	,,	500	217	250
14	9 4½	9/16	4½	7 2 0	,,	400	173	200
12	9 4¼	5/8	4	6 3 13	3	600	260	300
12	9 4¼	9/16	4¼	6 0 26	,,	500	217	300
10	9 4	9/16	4	5 0 16	,,	600	260	300
9	9 4	9/16	4	4 2 24	,,	...	...	...
8	9 4	1/2	4	3 2 23	,,	...	...	...
7	9 3½	7/16	3½	3 1 1	4	...	...	...
6	9 3½	13/32	3½	2 1 27	,,	...	...	...
5	9 3½	3/8	3½	2 1 27	,,	...	...	...
4	9 3	3/8	3	1 1 20	,,	...	...	...
3	9 3	3/8	3	1 0 10	,,	...	...	...
2	9 3	3/8	3	0 2 4	,,	...	...	...

For Specification, see p. 79.

TABLE VII.—*continued.*

Cost of Cast Iron Pipes per mile.

Diameter of Pipe.	Thickness of Pipe.	Weight per mile.	Cost per Mile 5*l.* per Ton.	Cost per Mile 6*l.* per Ton.	Cost per Mile Laying* and Jointing.
Feet.	Inch.	Tons.	£	£	£
1. 2	¾	460	2300	2760	792
2. 2	⅞	544¼	2721	3265	792
3. 2	1	625½	3127	3753	792
4. 2	1⅛	707	3535	4242	792
5. 3	1	906½	4532	5439	1144
6. 3	1⅛	1010	5050	6060	1144
7. 3	1⅜	1221	6105	7326	1144
8. 3	1¾	1590¾	7953	9544	1144
9. 4	1¼	1501½	7507	9009	1760
10. 4	1½	1888½	9442	11,331	1760
11. 4	1¾	2295½	11,492	13,791	1760
12. 4	2⅛	2733¼	13,666	16,400	1760
13. 5	1½	2249	11,245	13,494	2640
14. 5	2	3023½	15,117	18,141	2640
15. 5	2¼	3410	17,050	20,460	2640
16. 5	2½	3810	19,050	22,860	2640

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* This estimate for laying and jointing includes the spunyarn and lead, as also the excavating of trenches and refilling; fair average work, not rock cutting nor street work. The top of the pipe is supposed to be laid three feet below the surface of the ground; no allowance made for transport of pipe, which must of course depend on the distance from the foundry.

TABLE VIII.

Cast Iron, delivered and Fixed.

	£	s.	d.
17. Cast iron in large hollow columns, girders, &c. &c. .... per cwt.	0	10	0
18. Pipes of any thickness from 3 inches to 3 feet, inside diameter with socket joints............ per cwt.	0	9	0
19. Pipes of any thickness, with flanged joints, and fitted for screw bolts and nuts .... per cwt.	0	11	0
20. Open framing of any kind, as brackets, braces, steps, risers, &c., including fitting up ...... per cwt.	0	12	0
21. Cisterns and troughs .... „	0	10	0
22. Ditto, including waste pipes and ground-in plugs, and drilling holes to receive brass cocks ... per cwt.	0	13	0
23. Ditto, ditto, ditto, cast in separate plates, and put together with red lead, or iron cement, and screw bolts and nuts.................................per cwt.	0	13	0
24. Plates of any description, prepared and fitted for putting together with bolts and nuts.........per cwt.	0	12	0
25. Solid columns .... „	0	9	0
26. Hollow columns, with caps and bases; lamp posts, iron heel posts, including drilling............per cwt.	0	12	0
27. Girders or joists (light) .... „	0	9	0
28. Gratings for drains, &c...................... „	0	11	0
29. Stench traps, according to pattern......... „	0	15	0
30. Pump columns, including drilled eyes for handles, per cwt.	0	12	0
31. Furnace fronts, boilers, soot doors, steam flues, dampers, with wrought iron hinges, catches, &c., complete... per cwt.	0	16	0
32. Plate tenons for door posts, drilled and counter sunk .... per lb.	0	0	2
33. Pivot boxes for gates, including drilling ... „	0	0	4
34. Ornaments for palisading, and other light articles, cast in loam .... per lb.	0	0	2

TABLE VIII.—*continued.*

Cast Iron and Copper Work.

35. Gutters, pipes, &c., including wrought iron holdfasts, spikes, and screw brackets.	2½ inch.		3 inch.		3½ inch.		4 inch.		5 inch.	
	s.	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*
36. Rain-water gutters, semicircular per foot run	...		0	4½	0	5½	0	6½	0	9
37. Ditto pipes, or trunks per foot run	0	7	0	10½	1	1	1	3½	...	
38. Ditto heads ......each	2	0	2	6	3	3	4	0	...	
39. Perforated covers for heads ... .each	1	0	1	2	1	4	1	6	...	
40. Add to pipes for shoes or binds ....each	0	7	0	10	1	0	1	3	...	
41. Add to gutters for angles or binds ...each	...		0	4½	0	5½	0	6½	...	

COPPER WORK, FIXED COMPLETE.

	s.	*d.*
42. Copper sheet, cut to pattern, including copper or gun metal nails ....per lb.	1	4
43. Copper sheet, cut to pattern, and perforated as to air grates ....per lb.	1	9
44. Copper wrought in holdfasts, staples, &c. ...... „	1	8
45. Ditto, ditto, in screwed work, as bolts and nuts, &c. per lb.	2	0
46. Copper sheeting, as to doors, 12 ounces to the superficial foot, including copper ties and nails, girt measure on the face when finished ....per foot super	1	4
47. Ditto, all included, 16 ounces to the superficial foot, same measure ....per foot super	1	9
48. Ditto, all included, 18 ounces to the superficial foot ......per foot super	1	11

NOTE.—All ironwork fluctuates in price with that of iron; the above are suitable to average times, and are about 10 per cent. too high for the current year (1868). This note applies equally to Table IX.

TABLE IX.

IRONMONGERY.

Hinges, fixed; Door-handles, Ventilators, fixed; Locks, fixed; Padlocks, Nails, Tools, &c.	s.	d.
49. Hinges, butt, 3 inch, with 1½ inch screws, wrought iron ... per pair	1	0
50. Ditto ditto ditto, brass ... „	2	3
51. Ditto ditto 3½ inch, with 1½ inch screws, wrought iron ... per pair	1	3
52. Ditto ditto ditto, brass ... „	2	5
53. Ditto ditto 4 inch, with 1¾ inch screws, wrought iron ... per pair	1	7
54. Ditto ditto ditto, brass ... „	3	4
55. Ditto ditto 5 inch, with 1¾ inch screws, wrought iron ... per pair	2	1
56. Ditto ditto ditto, brass ... „	5	6
57. Ditto, back-flap table or shutter 1½ inch, ¾ inch screw, wrought iron ... per pair	0	8
58. Ditto ditto ditto 1¾ inch, ¾ inch screw, wrought iron ... per pair	0	10
Hinges, cross garnet, wrought iron, fixed.		
59. Hinges, cross garnet, T or strap...10 inch...per pair	0	10
60. Ditto ditto ditto......12 „ ... „	1	3
61. Ditto ditto ditto......14 „ ... „	1	6
62. Ditto ditto ditto......16 „ ... „	2	0
63. Ditto, H, wrought iron ... 6 „ ... „	0	9
64. Ditto ditto ... 8 „ ... „	1	1
65. Ditto ditto ...10 „ ... „	1	4½
66. Ditto ditto ...12 „ ... „	1	5
67. Fasteners for sashes, strong screw, brass head with screws, 2¾ inch ... each	0	6½
68. Ditto ditto ditto 3½ inch ... „	0	10
69. Ditto ditto, brass barrel screw, with brass head with screws, 1¾ inch ... each	1	4
70. Ditto ditto ditto 2¼ inch ... „	1	6
71. Brass door handles with screws, middling size „	0	10
72. Ditto ditto ditto, large size ... „	1	0
73. Brass drawer handles with screws, 3½ inch ... „	0	7
74. Door springs, japanned iron, brass mounted, with screws, 18 inch ... each	3	3
75. Ditto ditto ditto, 24 inch ... „	4	4

TABLE IX.—*continued.*

Ironmongery.

	s.	d.
76. Pivots and sockets for swing sashes, wrought iron, with screws .... per pair of one pivot and socket	0	8
77. Ventilators, fixed, Arnott's, with balanced valves, plain iron, small size, 18″ × 8″, with brass rack fastener and copper wire ....each	7	0
78. Ditto, large size, 16″ × 10″........................ „	11	0
79. Ditto, small size, bronzed and leathered......... „	8	6
80. Ditto, large, ditto ditto .... „	12	0
81. Ventilators, Sheringham's, small size, 9″ × 3″, with line pulley and fastener .... each	7	6
82. Ditto, large size, 13½″ × 6″ .... „	12	0
83. Ditto, small sized, bronzed .... „	9	6
84. Ditto, large ditto .... „	14	0

Locks supplied, fitted and fixed, everything complete.

	Stock locks, best fine plate with common or cast iron box staples :—	s.	d.	Iron rim locks, dead shot with fine round wards and brass bushed key holes :—	s.	d.
85.	7 inch ......each	1	9	6 inch ....each	3	2
86.	8 „ ...... „	2	1	7 „ .... „	3	9
87.	9 „ ...... „	2	6	8 „ .... „	5	2
88.	10 „ ...... „	2	9	10 „ .... „	6	9

			s.	d.
89.	Drawback locks, with fine round wards, brass bushed holes, and back slides	8 inch ...each	5	3
90.		9 „ ... „	6	3
91.		10 „ ... „	7	4
	Add, if with brass handle and side plate on both sides,	per lock	2	0
92.	Two bolt, Hobbs' or Tucker and Reeves' patent machine made 4 lever lock	6 inch ...each	11	3
93.		7 „ ... „	13	0
94.	Padlocks, fine bridge, thick warded, spring and tumbler, with brass bush and scutcheon	2 „ ... „	1	2
95.		3 „ ... „	1	5
96.		3½ „ ... „	2	0
97.	Chubb's patent padlocks with two keys ...... „		40	0

	2 inch.		2½ inch.	
	s.	d.	s.	d.
98. Iron sash pulley, with stout turned axle, each	0	4½	0	5½
99. Iron frame, with brass face and wheel... „	1	0	1	2
100. Ditto, ditto, and brass axle .... „	1	4	1	6

TABLE IX.—*continued.*

Ironmongery.

			s.	*d.*
101. Cast copper or gun metal nails..................		per lb.	1	3
102. Wrought copper ditto, above 36 lbs. per 1000		„	1	6
103. Ditto, from 7 to 36 lbs., inclusive	„	„	1	8
104. Ditto, under 7 lbs.	„	„	2	0
105. Wrought iron spike of any size..................		„	0	2½
106. Ditto, rose headed, clout, clasp, or brad, 36 lbs. and upwards per thousand................................		per lb.	0	2½
107. Ditto, 20 lbs. and under 36 lbs. per thousand		„	0	3
108. Ditto, 12 lbs. and under 20 lbs.	„	„	0	3½
109. Ditto, 7 lbs. and under 12 lbs.	„	„	0	4
110. Ditto, 4 lbs. and under 7 lbs.	„	„	0	4½
111. Ditto, 2 lbs. and under 4 lbs.	„	„	0	6

TOOLS.—Carpenter's axes with handles, each, 4*s.* 6*d.*; jack planes, each, 4*s.* 6*d.*; smoothing planes, each, 4*s.*; trying planes, each, 6*s.* 6*d.*; hand saws, each, 6*s.*; tenon saws, 12 inch, each, 4*s.*; pickaxes, with handles, each, 3*s.* 6*d.*; gimlets, assorted, per dozen, 4*s.*; carpenter's hammers, middling size, each, 2*s.*; pavior's ditto, per lb., 6*d.*; smith's files, per inch, 1½*d.*; rasps, per inch, 1*d.*

SUNDRIES.—Rope, tarred, per cwt., 60*s.*; ditto, white, per cwt., 68*s.*; Stockholm tar, per gallon, 1*s.* 2*d.*; coal gas tar, per gallon, 4*d.*; white lead, ground in oil for jointing, per lb., 4*d.*; pitch, per lb., 1*d.*; iron wire, Nos. 1 to 8 gauge, per lb., 4*d.*; Nos. 9 to 16, per lb., 6*d.*; Nos. 17 to 26, per lb., 8*d.*; brass wire, Nos. 1 to 26, per lb., 1*s.* 4*d.*; copper bell wire, per lb., 1*s.* 3*d.*; asphalted felt, per yard super, 9*d.*

See note, p. 84, with regard to fluctuations in the price of ironwork.

TABLE X.

PAINTER'S WORK,

Including all contingencies of Cleaning, Stopping, Knotting, Reputtying, &c.

	s.	*d.*
1. Painting with anticorrosion paint, per yard super ...	0	2½
2. Add for every additional coat „ „ ...	0	1½
3. Painting or paying over with Stockholm tar, mixed with ochre or Spanish brown and pitch, per yard super	0	3½
4. Add for additional coat .... „ „	0	2½
5. Painting or paying over with coal tar, mixed with 1 lb. of pitch and 1 lb. of rosin to 6 gallons of tar per yard super	0	1¼
6. Add for additional coat .... „	0	0¾
7. Painting with mineral paint......... „	0	1¾
8. Add for additional coat............... „	0	1¼

	1 coat.		2 coats.		3 coats.	
	s.	*d.*	*s.*	*d.*	*s.*	*d.*
9. Painting in common colours per yard super	0	2½	0	4	0	5½
10. Ditto, inside cornices and ornamental columns, pilasters, and entablatures per yard super	0	3¾	0	6	0	8¼
11. Enriched cornices ...... „ „	0	7½	1	0	1	4½
12. Plain outside cornices... „ „	0	3¾	0	6	0	8¼
13. Skylights one side to out and out of frame .... per yard super	0	4	0	7	0	10
14. Iron railings and gates, net length and height to be taken measured on one side only .... per yard super	0	4	0	6	0	8
15. Trough gutters and water trunks per yard lineal	0	2¼	0	4	0	5¾
16. Chains, angle staves, rails, gas pipes, coping edges, iron bars, plain or ornamental, reveals, skirting per yard lineal	0	1¼	0	1¾	0	2¼
17. Hinges, lamps, sash frames with transoms (each division to be considered a frame) one side; window sills, casement lights one side .... each	0	2½	0	4	0	5½

TABLE X.—*continued.*

Painter's Work, including all contingencies of Cleaning, Knotting, Repairing, &c.

	4 coats.		Flatting.	
	s.	*d.*	*s.*	*d.*
Painting in common colours ...... per yard super	0	7	0	2½
Ditto, inside cornices and ornamental columns, pilasters, and entablatures ...... per yard super	0	10½	0	3¾
Enriched cornices .... ,, ,,	1	9	0	7½
Plain outside cornices .... ,, ,,	0	10½	...	
Skylights one side to out and out of frame per yard super	1	1	...	
Iron railings and gates, net length and height to be taken, measured on one side only per yard super	0	10	...	
Trough gutters and water trunks...per yard lineal	0	7½	...	
Chains, angle staves, rails, gas pipes, coping edges, iron bars, plain or ornamental, reveals, skirtings .... per yard lineal	0	2¾	0	1¼
Hinges, lamps, sash frames with transoms (each division to be considered a frame) one side; window sills, casement lights one side......each	0	7	...	

Copal varnish, per gallon, 28*s.*; linseed oil, per gall., 3*s.* 6*d.*; ditto boiled, per gall., 4*s.*; spirits of turpentine, per gall., 4*s.*; mineral paint, per gall., 1*s.* 9*d.*; Prussian blue, per lb., 4*d.*; Spanish brown, per lb., 2½*d.*; red lead, dry, per lb., 4*d.*; lamp black, per lb., 4*d.*; ivory black, per lb., 5*d.*; anticorrosion, dry, per lb., 3½*d.*; litharge, per lb., 4½*d.*; red lead putty, per lb., 3*d.*; white lead ground in oil, per lb., 3¾*d.*; oxide of zinc ground in oil, per lb., 4*d.*; prepared paint of white lead, or other common colour, mixed ready for use, per lb., 4½*d.*; ditto, with patent oxide of zinc, per lb., 4¾*d.*; oakstain of asphalte and raw sienna, per gall., 7*s.* 6*d.*

TABLE XI.

Glass.

					s.	d.
1.	15 oz. crown window glass, or flattened sheet glass, not exceeding 3 feet in one square, best quality			per foot super	0	7
2.	Ditto	ditto	second quality	,,	0	5½
3.	Ditto	ditto	third quality	,,	0	4½
4.	21 oz.	ditto	best quality	,,	0	8½
5.	Ditto	ditto	second quality	,,	0	7
6.	Ditto	ditto	third quality	,,	0	6
7.	26 oz.	ditto	best quality	,,	0	11
8.	Ditto	ditto	second quality	,,	0	9
9.	Ditto	ditto	third quality	,,	0	8
10.	15 oz. fluted		third quality	,,	0	8
11.	21 oz. ditto		third quality	,,	0	10
12.	Rough plate glass, ⅛ inch thick............			,,	0	8
13.	Ditto	3/16	,, ...	,,	0	10
14.	Ditto	¼	,, ...	,,	0	11
15.	Ditto	⅜	,, ...	,,	1	1
16.	Ditto	½	,, ...	,,	1	5
17.	Add to the above, if exceeding 3 feet in one square			,,	0	2
18.	Perforated sheet glass, ⅛ inch thick			,,	2	6
19.	Ditto ditto, zinc			,,	0	10

TABLE XII.

PLASTERER'S WORK.

		Straight.		Curved.	
		s.	*d*	*s.*	*d.*
1. Rendering, one coat	per yard super	0	4	0	4¼
2. Ditto, one coat, and set with fine stuff	„	0	5¾	0	6¼
3. Add for additional coat and ditto	„	0	2	0	2
4. Render and float	„	0	6¾	0	7¾
5. Ditto ditto, and set with fine stuff	„	0	8½	0	9¾
6. Ditto ditto ditto, and with putty and plaster	„	0	10	0	11½
7. Chimney openings rendered and set	each	1	3		
8. Add for blackening	„	0	5		
9. Rendering with cement, Roman, Medina, or Harwich, one coat, half cement and half sand, ¾ inch thick	per yard super	1	3	1	6
10. Ditto, two of cement and one of sand	„	1	7	1	10
11. Render and float, half cement and half sand, ⅞ inch thick	„	1	8	1	11
12. Ditto, two of cement and one of sand	„	1	11	2	1
13. Add for using Portland cement in either of the above instead of Roman, Medina, or Harwich	„	0	3	0	3
14. Rough casting on brick or stone, one coat	„	0	3½	0	4
15. Add for additional coat	„	0	3	0	3½
16. Lath and plaster and rough cast	„	1	1	1	2
17. Render, float and rough cast	„	0	10	1	0
18. Add for lath and a half	„	0	1¾	0	2
19. Ditto for double lath	„	0	3½	0	4
Stucco Imitation of Stone.					
20. Render, float and stucco with wash sand	„	0	11	1	0½
21. Lath, plaster, float and stucco.	„	1	4	1	6
22. Add, if trowelled	„	0	1	0	1¼
23. Add, if double laths	„	0	3	0	4

TABLE XII.—*continued.*

Plasterer's Work.

	Straight.		Curved.	
	s.	*d.*	*s.*	*d.*
24. Lath and plaster, one coat ... per yard super	0	10	0	11
25. Ditto, ditto, set with fine stuff "	1	0	1	1
26. Add if with putty and plaster ... "	0	1½	0	2
27. Lath and plaster, two coats, set with fine stuff .... per yard super	1	2	1	3
28. Add if with putty and plaster "	0	1½	0	1½
29. Lath, plaster, and float ...... "	1	1	1	2½
30. Ditto, ditto, and set with fine stuff per yard super	1	3	1	4½
31. Ditto, ditto, and set with putty and plaster per yard super	1	4¼	1	6½
32. Add for using double fir laths "	0	3¼	0	4¼
33. Cornices and mouldings in cement, and run with a mould, including mitres, throating, arrises, &c. .... per foot super	0	10	1	1
34. Ditto, ditto, in plaster, ditto, ditto per foot super	0	6	0	7½

WHITEWASHING AND COLOURING.

	s.	*d.*
35. Washing and stopping .... per sq. of 100 ft.	0	4
36. Scraping, washing, and stopping... "	0	8
37. Limewhiting, one coat .... "	0	5½
38. Add for additional coat........ "	0	2
39. Whiting with whiting and size, one coat per sq. of 100 ft.	0	8
40. Add for additional coat........ "	0	3½
41. Colouring in buff, or other common colour, one coat per sq. of 100 ft.	1	0
42. Add for additional coat........ "	0	5
43. If in French grey, or other superior colour, one coat per sq. of 100 ft.	1	6
44. Add for additional coat........ "	0	9
For any of the above in cornices take twice the above prices.		
45. Colouring with lime and copperas in outside work per sq. of 100 ft.	1	0
46. Colouring in any common colour, ditto, ditto per sq. of 100 ft.	1	3

Table XII.—*continued.*

Plasterer's Work.

Materials.

		s.	d.
47. Cements, Roman, Medina, or Harwich	per bushel	1	8
48. Ditto, Scott's hydraulic	"	1	4
49. Ditto, Portland	"	2	6
50. Ditto, fine Parian	"	6	0
51. Ditto, coarse ditto	"	3	3
52. Ditto, Martin's fine	per cwt.	6	6
53. Ditto, coarse	"	5	0
54. Plaster	per bushel	0	10
55. Plaster of Paris, ground fine	per bag of 14 lbs.	0	5
56. Colours, Dutch pink, and rose pink	per lb.	0	6
57. Ditto, lamp black, spruce ochre, Prussian blue	"	0	4
58. Ditto, Venetian red, blue black, English umber	"	0	3
59. Ditto, yellow ochre	"	0	2½

Size, per gallon, 5*d.*; double size, per gallon, 9*d.*; best washed whiting, per 14 lbs., 5*d.*; hair, washed and thrashed, per lb., 1*s.* ¾*d.*; cast iron lathing nails, per lb., 2*d.*; wrought iron ditto, per lb., 4*d.*; single fir laths, per bundle of 500, 2*s.*; ditto lath and a half, per ditto, 2*s.* 9*d.*; double ditto, per ditto, 3*s.* 6*d.*; lime, unslaked, per foot cube, 5*d.*; sand, per cubic yard, 3*s.*; washed sand for stucco, per cubic yard, 4*s.*; coarse yellow soap, per lb., 4*d.*; ditto, best crown, per lb., 5*d.*; copperas, per lb., 3*d.*; oil of vitriol, per lb., 3*d.*; potash, per lb. 7*d.*; soda, per lb. 2*d.*

TABLE XIII.

PLUMBER'S WORK, PUMPS, &c.

	3 in. diam.		4 in. diam.		5 in. diam.		6 in. diam.	
	£	s.	£	s.	£	s.	£	s.
1. Wrought iron contractors' pump, 14 feet height under spout	...		5	10	6	0	6	17
2. Sliding suction for lengthening ditto, 8 feet 6 inches long, so that the pump may be worked to a depth of 22 feet	...		3	3	3	10	3	13
3. Wrought iron barge pump, 7 feet height under spout	3	10	4	4	4	10	5	0
4. Cast iron barge pumps, bored barrels, 7 feet height under spout	...		2	7	3	1	3	10
5. Cast iron garden pump	2	7	3	15	...		...	
6. Ditto, with brass buckets and sucker-boxes	3	0	4	15	...		...	
7. Jack pump, with copper barrel, brass bucket, &c.	3	3	3	15	...		...	
8. Lead jack pump	2	0	3	10	...		...	
9. Strong lift pump on planks	6	9	8	10	...		...	
10. Double barrel deep well pump with doors for removal of valves, brass barrels and buckets and copper rods	13	13	18	5	38	0	49	10
11. Treble barrel ditto, ditto	20	0	31	0	60	0	75	0
12. Single barrel ditto, ditto	4	10	6	15	...		...	

	7 in. diam.		8 in. diam.		9 in. diam.	
	£	s.	£	s.	£	s.
Wrought iron contractors' pump, 14 feet height under spout	9	13	11	17	14	7
Sliding suction for lengthening ditto, 8 feet 6 inches long, so that the pump may be worked to a depth of 22 feet	3	18	4	7	4	15
Cast iron barge pumps, bored barrels, 7 feet height under spout	5	3	6	16	...	
Treble barrel, ditto, ditto, ditto	95	0	...		...	

TABLE XIII.—*continued.*

Plumber's Work, Pumps, &c.

	£	s.	d.
13. Artesian pumping apparatus, supported at ground level and not requiring any descent of well in fixing the same, with plain cast iron pump case complete, 3-inch brass artesian pump, screwed at top and bottom for wrought iron pipe, wrought iron pipe in lengths for screwing, well rod with brass screw joints, strainer for suction pipe, for a well not exceeding 30 feet deep	12	12	0
14. For every foot extra depth of well ... add per foot	0	2	6
15. Artesian pumping apparatus, with fluted cast iron pump case complete, cast iron flange pipe large enough to allow brass bucket of pump to pass through it, 3¾ inch brass artesian pump with flanges at top, copper suction pipe with strainer, cast iron bottom stage to carry pump, well rod with brass screw joints, bolts, nuts, washers, for a well 30 feet deep	22	0	0
16. For every foot extra depth of the well, add per foot	0	4	6
17. Horse-wheel frame and gear, with double crank, wheel and pinion motion, shafting fixed below ground, slings and guides, bolts and nuts all complete	27	0	0
17*a*. Ditto, ditto, shafting above ground, ditto, ditto	16	0	0
18. Wood pole for horse-wheel frame, hook and swingle tree for one horse	2	2	0
19. Ditto ditto ditto, for two horses	4	4	0
20. Cast iron well stage, 5 feet long, to be fixed at about every 12 feet in depth of the well, with roller guides for well rods and clips for rising main pipe, with shoes for fixing in walls for single pump, as Item No. 12	2	0	0
21. Ditto, ditto, for double pump, as Item No. 10 ...	2	6	0
22. Ditto, ditto, for treble pump, as Item No. 11 ...	2	12	0
Items 20, 21, and 22 apply only for pumps up to 4 inches; extra for larger sizes.			
23. Apparatus for applying steam power, as to Items 10, 11, or 12; treble crank, with wheel and pinion motion, plummer blocks, slings and guides, fast and loose riggers, all complete for fixing to staging over the well	32	0	0
24. Ditto, ditto, double crank, ditto, as last item ...	20	0	0

TABLE XIII.—*continued.*

Plumber's Work, Pumps, Pump Fittings.

	⅝ inch.		¾ inch.		⅞ inch.		1 inch.	
	s.	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*
25. Well rod, including joint and bush, in 12 feet lengths per foot	0	8	0	9	1	2	1	5
26. Well rod joint and bush each	3	3	4	3	5	3	7	3
Square bush for rod joint ...each	1	0	1	2	1	6	2	3

	s.	*d.*
27. Short shoulder flanches for connecting copper pipe with leather washer and copper screws, for 1¼ inch pipe ...per pair	7	0
28. Ditto, ditto ....1½ ditto .... „	7	6
29. Ditto, ditto ....1¾ ditto .... „	8	0
30. Ditto, ditto ....2 ditto .... „	9	0
31. Ditto, ditto ....2¼ ditto .... „	11	0
32. Ditto, ditto ....2½ ditto .... „	12	6
33. Ditto, ditto ....2¾ ditto .... „	13	3
34. Ditto, ditto ....3 ditto .... „	14	0
35. Straight brass pump barrels, bored ....per lb.	1	6½

	2½ inch.		3 inch.		3½ inch.		4 inch.	
	s.	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*
36. Copper barrels with ¼ inch shoulder, 16 inches length, each	7	0	7	6	8	6	9	6

	s.	*d.*
37. Brass pump barrels, bored, with tinned taper ends per lb.	1	6½

2½	inch,	weight about	11 lbs.	per yard.
3	„	„	14½	„
3½	„	„	17	„
4	„	„	24	„
4½	„	„	29	„
5	„	„	42	„
6	„	„	58	„

38. Strong copper air vessel, 8 inches diameter, and 15 inches in height, 1¾ and 2½ inches bore at neck, for 2 inch pipes .... each	20	0
39. Ditto, 9 inches diameter and 16 inches in height, for 3, 3½ and 4 inch pumps ....each	22	0

TABLE XIII.—*continued.*

Plumber's Work, Pumps, Pump Fittings, Pipes.

						s.	d.
40. Cast iron flange pipe with raised and turned faces, for hydraulic purposes		1¼ inch	6 feet lengths,		per yard	2	0
41. Ditto	ditto	1½	ditto	ditto	„	2	9
42. Ditto	ditto	2	ditto	ditto	„	3	0
43. Ditto	ditto	2½	ditto	ditto	„	3	6
44. Ditto	ditto	3	ditto	ditto	„	4	6
45. Ditto	ditto	3½	ditto	ditto	„	5	6
46. Ditto	ditto	4	ditto	ditto	„	6	6

Strong copper pipe tinned, with chamfered joints, proved to 100lbs. pressure per inch.

		Diameter.	Per foot.		Diameter.	Per foot.	
			s.	d.		s.	d.
47. Ditto	ditto	1 inch	1	6	3 inch	5	0
48. Ditto	ditto	1¼ „	1	7	3½ „	5	7
49. Ditto	ditto	1½ „	1	9	4 „	6	4
50. Ditto	ditto	1¾ „	2	2	4½ „	7	6
51. Ditto	ditto	2 „	2	7	5 „	8	6
52. Ditto	ditto	2¼ „	3	0	6 „	9	8
53. Ditto	ditto	2½ „	3	6	6½ „	11	0
54. Ditto	ditto	2¾ „	4	0	7 „	13	0
55. Cast copper pump screws					per dozen	6	0

	INTERNAL DIAMETER.							
	¼ inch.		⅜ inch.		½ inch.		¾ inch.	
	s.	d.	s.	d.	s.	d.	s.	d.
56. Black wrought iron pipe, from 4 to 14 feet lengths ...per foot	0	2½	0	3	0	3½	0	4
57. Ditto, from 2 to 4 feet lengths 1*d.* per foot extra								
58. Short pieces under 2 feet, each	0	4½	0	5½	0	7	0	9
59. Connecting pieces or long screws .... each	0	6	0	7	0	9	0	11
60. Wrought iron bends ... „	0	5	0	5½	0	6	0	7½
61. Wrought iron ties, equal or diminished .... each	0	5	0	5½	0	7	0	10
62. Wrought iron crosses, equal or diminished .... each	0	9	0	11	1	2	1	4
63. Sockets, diminished...... „	0	3	0	3½	0	3½	0	4
64. Ditto, plain .... „	0	2	0	2½	0	2½	0	3
65. Caps, plugs, nipples, and backnuts .... each	0	3	0	3½	0	3½	0	4
66. Flanges .... „	0	7½	0	7½	0	9	0	11

TABLE XIII.—*continued.*

Plumber's Work, Pumps, Fittings to Hydraulic Works, Pipes, &c.

	INTERNAL DIAMETER.							
	1 inch.		1¼ inch.		1½ inch.		2 inch.	
	s.	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*
Black wrought iron pipe, from 4 to 14 feet lengths......per foot	5	0½	0	7½	0	10	1	3
Ditto, from 2 to 4 feet lengths 1*d.* per foot extra								
Short pieces under 2 feet ...each	1	0	1	4	1	6	2	3
Connecting pieces or long screws each	1	2	1	6	1	8	2	8
Wrought iron bends .... „	0	9	1	4	1	8	2	10
Wrought iron ties, equal or diminished ....each	1	2	1	6	1	11	2	11
Wrought iron crosses, equal or diminished ....each	1	8	2	3	2	6	3	7
Sockets, diminished .... „	0	4½	0	6	0	7	0	11
Ditto, plain.................... „	0	4	0	5½	0	6	0	9
Caps, plugs, nipples, and back-nuts.........................each	0	4½	0	6	0	7	0	11
Flanges .... „	1	0	1	2	6	4	1	6

	INTERNAL DIAMETER.							
	¼ inch.		⅜ inch.		½ inch.		¾ inch.	
	s.	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*
67. Item 56, galvanized	0	4	0	4½	0	5	0	6
68. Ditto 57, ditto, 1*d.* per foot extra								
69. Ditto 58, ditto	0	7	0	8½	0	10½	1	2
70. Ditto 59, ditto	0	9½	0	11	1	1	1	4
71. Ditto 60, ditto	0	7½	0	8½	0	9½	1	0
72. Ditto 61, ditto	0	8	0	8½	0	11	1	4
73. Ditto 62, ditto	1	2	1	6	1	9	2	1
74. Ditto 63, ditto	0	4½	0	6	0	6	0	6½
75. Ditto 64, ditto	0	3	0	3½	0	3½	0	5
76. Ditto 65, ditto	0	4½	0	5½	0	5½	0	6
77. Ditto 66, ditto	1	0	1	0	1	2	1	5

TABLE XIII.—*continued.*

Plumber's Work, Pumps, Fittings to Hydraulic Works, Pipes, and Stopcocks.

	INTERNAL DIAMETER.							
	1 inch.		1¼ inch.		1½ inch.		2 inch.	
	s.	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*
Item 56, galvanized..............	0	8½	1	0	1	3½	1	11
Ditto 57, ditto, 1*d.* per foot extra								
Ditto 58, ditto	1	5½	2	1	2	4	3	6
Ditto 59, ditto	1	9	2	4	2	8	4	1
Ditto 60, ditto	1	2	2	1	2	8	4	5
Ditto 61, ditto	1	9	2	4	2	11	4	6
Ditto 62, ditto	2	8	3	6	3	10	5	7
Ditto 63, ditto	0	7	0	10	1	0	1	6½
Ditto 64, ditto	0	6	0	9	0	10	1	2
Ditto 65, ditto	0	7	0	9½	0	10½	1	6½
Ditto 66, ditto	1	7	1	9	2	1	2	6

	INTERNAL DIAMETER.							
	½ inch.		⅝ inch.		¾ inch.		1 inch.	
	s.	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*
78. Square way stopcock, keys or square heads, rivet bottom......	2	2	2	6	3	0	6	3
79. Ditto, screw bottom	2	8	3	1	3	8	7	4
80. Square way stopcocks, screwed ends for iron pipe, screw bottom....................	3	3	...		4	8	8	6
80*a*. Square way stopcock, union one end, screw bottom	3	9	4	4	5	6	9	7
81. Ditto, union both ends, screw bottom	5	0	5	7	7	2	11	8
82. Gas cocks, screwed for iron pipe	1	8	...		2	6	5	1
83. Brass spanners.................	0	6	0	8	0	9	1	4
84. Iron spanners	...		...		0	8	1	0
85. Gun metal stopcock, screwed for iron pipe	4	6	...		6	6	10	0
86. Gun metal gland stopcock, screwed for iron pipe...........	10	0	...		13	0	21	6
87. Round shank bib cock, rivet bottom	2	2	2	9	3	0	6	3

TABLE XIII.—*continued.*

Plumber's Work, Pumps, Fittings to Hydraulic Works, Stopcocks.

	INTERNAL DIAMETER.							
	½ inch.		⅝ inch.		¾ inch.		1 inch.	
	s.	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*
88. Item 87, screw bottom	2	8	3	1	3	8	7	4
89. Screw ferrule bib cock, rivet bottom	2	9	3	5	4	0	8	0
90. Ditto, screw bottom	3	3	4	0	4	8	9	1
91. Round shank ball cock, rivet bottom	2	2	2	6	3	0	6	3
92. Ditto, screw bottom	2	8	3	1	3	8	7	4
93. Screw ferrule ball cock, screw bottom	3	3	4	0	4	8	9	1
94. Copper water balls...........	1	8	2	0	2	3	3	6
95. Full way shield pattern range, or hob boiler, cocks	5	8	6	7	7	9	13	0
96. Butt cock, screw bottom......	3	4	4	1	4	8	9	1
97. Round way stop cock, with iron spanner	...		...		6	3	12	3
98. Round way bath cock (one inch), from 11*s.* to 15*s.*								
99. Round way vat cock, with screw and nut one end and hose union at the other..............	...		...		...		18	0
100. Round way ball cock, screw ferrule	...		...		6	3	12	9
101. Copper ball to ditto	...		...		3	2	6	0
102. High pressure ball valves, with screw ferrule for lead pipe, or screw cut for iron pipe	3	0	3	7	4	2	7	0
103. Copper ball and rod to Item 102	1	8	2	0	2	3	3	6
104. Improved screw down cock, to be free from leakage under heavy pressure, stop rough, screwed for iron, gland top...	35	0	40	0	46	0	85	0

TABLE XIII.—*continued.*

Prices of Plumber's Work, Fittings to Hydraulic Works, Stopcocks and Valves.

	INTERNAL DIAMETER.							
	1¼ inch.		1½ inch.		1¾ inch.		2 inch.	
	s.	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*
Square way stop cock, keys or square heads, rivet bottom......		4	10	6	18	0	26	0
Ditto, screw bottom	9	7	12	0	29	0	30	0
Gas cocks, screwed for iron pipe	...		13	10	...		32	0
Iron spanners.......................	1	3	1	9	...		2	6
Gun metal stop cock, screwed for iron pipe.........................	15	0	22	0	...		40	0
Gun metal gland stop cock, screwed for iron pipe............	27	0	38	0	...		47	0
Round shank bib cock, rivet bottom	8	4	10	6	18	0	26	0
Ditto, screw bottom	9	7	12	0	20	0	29	0
Screw ferrule bib cock, rivet bottom...............................	10	9	13	3	23	0	32	0
Ditto, screw bottom	12	0	14	8	25	0	36	0
Round shank ball cock, rivet bottom...............................	8	4	10	6	...		...	
Ditto, screw bottom	9	7	12	0	...		...	
Screw ferrule ball cock, screw bottom	12	0	15	0	...		...	
Copper water balls.................	6	0	10	0	...		16	0
Butt cock, screw bottom	11	3	15	0	...		35	6
Round way stop cock, with iron spanner	18	8	26	0	37	0	55	0
Round way vat cock, with screw and nut one end and hose union at the other	26	6	36	0	48	0	65	0
Round way ball cock, screw ferrule	19	8	27	6	...		...	
Copper ball to ditto	10	0	16	0	...		...	
High pressure ball valves, with screw ferrule for lead pipe, or screw cut for iron pipe	13	6	17	6	...		45	0
Copper ball and rod to Item 102	6	0	10	0	...		16	0

TABLE XIII.—*continued.*

Plumber's Work, Pumps, Fittings to Hydraulic Works, Valves, Hydrants, Street Pumps, &c.

	Inch.	£	s.	Inch.	£	s.
105. Cast iron high pressure sluice valve, gun metal faces and screws and planed surfaces, proved to 100 lbs. to the square inch	2	4	4	4	8	8
	2½	5	5	5	10	10
	3	6	6	6	12	12
106. Cast iron valves with metal spindles, stops, and seatings	2	2	0	7	7	17
	2½	2	10	8	9	0
	3	3	0	9	10	3
	4	4	0	10	12	16
	5	5	0	11	13	15
	6	6	0	12	15	0

	£	s.	d.
107. Stand pipe with swivel elbow, copper with gun metal mountings for 2-inch hose pipe	3	10	0
108. Patent pillar hydrant or firecock, with 2-inch valve..	7	0	0
109. Ditto, with 2½-inch valve	8	0	0
110. Dwarf hydrant or firecock, with iron cover for footway, screwed two-inch brigade gauge	1	14	0
111. Ditto, with iron cover for roadway, screwed two-inch brigade gauge....................................	1	19	0
112. Gun metal gland firecock, with cap spanner and hose wrench, screwed for two-inch brigade gauge	3	13	0
113. Cast iron fluted pillar water post, with self-closing lever valve for drawing water in streets and court-yards	6	0	0
114. Ditto, ditto, for ditto, and with hydrant for fire-hose	12	0	0
115. Plain cast iron pump case for fixing against walls, with 60 feet loaded handle	6	0	0
116. Ditto, for streets, with 60 feet loaded handle, fitted with cistern head	10	0	0
117. Ornamental ditto, with ditto, and sink to ditto..	31	0	0
118. Ornamental cast iron pillar pump case, fitted with wrought iron pendulum motion handle, with cast iron 3-inch working barrel, brass bucket, valve and valve door for well not exceeding 25 feet deep	8	8	0

TABLE XIII.—*continued.*

Plumber's Work, Pumps, Fittings to Hydraulic Works, Hose Pipes, &c.

	INCHES INSIDE DIAMETER.					
	1¼ inch.		1½ inch.		1¾ inch.	
	s.	*d.*	*s.*	*d.*	*s.*	*d.*
119. Copper rivetted leather delivery hose pipe .... per foot	2	1	2	4	2	6
120. Union hose screws for Item 119 ...	5	6	6	4	8	0
121. Vulcanized india-rubber delivery hose pipe, per foot:—						
1 ply ...	1	1	1	2	1	4
2 ply ...	1	6	1	8	1	11
3 ply ...	1	11	2	1	2	5
4 ply ...	2	5	2	9	3	0
122. Canvas delivery hose pipe per yard	2	0	2	3	2	8

	INCHES INSIDE DIAMETER.					
	2 inch.		2¼ inch.		2½ inch.	
	s.	*d.*	*s.*	*d.*	*s.*	*d.*
Copper rivetted leather delivery hose pipe .... per foot	2	9	3	0	3	3
Union hose screws for Item 119	9	6	10	6	1	4
Vulcanized india-rubber delivery hose pipe, per foot:—						
1 ply ...	1	6	1	8	1	11
2 ply ...	2	1	2	4	2	6
3 ply ...	2	9	3	0	3	4
4 ply ...	3	4	3	9	4	1
Canvas delivery hose pipe ...... per yard	3	0	3	4	3	9

	INCHES INTERNAL DIAMETER.							
	½ inch.		⅝ inch.		¾ inch.		1 inch.	
	s.	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*
123. India-rubber canvas delivery hose pipe, per foot:—								
1 ply ...	0	5	0	6	0	7	0	9
2 ply ...	0	8	0	9	0	10	1	0
3 ply ...	0	18	0	11	1	0	1	4
124. With galvanized spiral wire for suction ....add per foot	0	2	0	2	0	3	0	3

TABLE XIII.—*continued.*

Prices for Plumber's Work, Fittings to Hydraulic Works, Hose Pipes, Fire Engines.

	INCHES INTERNAL DIAMETER.							
	1¼ inch.		1½ inch.		1¾ inch.		2 inch.	
India-rubber canvas delivery hose pipe, per foot:—	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*
1 ply ...	0	10	0	11	1	0	1	2
2 ply ...	1	2	1	4	1	6	1	8
3 ply ...	1	6	1	8	1	11	2	2
With galvanized spiral wire for suction .... add per foot	0	4	0	4	0	5	0	6

	INCHES INTERNAL DIAMETER.							
	2¼ inch.		2½ inch.		2¾ inch.		3 inch.	
India-rubber canvas delivery hose pipe, per foot:—	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*
1 ply	1	4	1	6	1	8	1	10
2 ply ...	1	10	2	0	2	3	2	6
3 ply ...	2	5	2	8	2	1	3	2
With galvanized spiral wire for suction .... add per foot	0	7	0	8	0	9	0	10

	INCHES INTERNAL DIAMETER.							
	3¼ inch.		3½ inch.		3¾ inch.		4 inch.	
India-rubber canvas delivery hose pipe, per foot:—	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*
1 ply ...	2	0	2	3	2	6	2	9
2 ply ...	2	9	3	0	3	3	3	6
3 ply ...	3	5	3	8	4	0	4	4
With galvanized spiral wire for suction .... add per foot	0	11	1	0	1	1	1	2

	£	*s.*	*d*
125. Fire engine for 4 men, painted wood cistern, holding 40 gallons, mounted on cast iron wheels, fitted with two 3-inch brass barrels, 1½-inch suction cock and cap, &c. &c.; two five feet lengths of 1½-inch leather suction pipe and copper rose, all complete, to discharge 20 gallons per minute 40 feet high	20	0	0
126. Ditto, for eight men, ditto, ditto, ditto, to throw 30 gallons per minute 50 feet high	35	0	0

TABLE XIII.—*continued.*

Plumber's Work, Fire Engines—Repairs.

	£	s.	d.
127. Fire engine, fitted in oak cistern with driving box and side boxes for brass pipe and suction, mounted on elliptic springs, strong wood spoke wheels, wrought iron fore-locking carriage, &c. &c.			
Engine for 16 men, 5 inch barrels	100	0	0
Ditto, for 20 ditto, 6 inch ditto	110	0	0
Ditto, for 30 ditto, 7 inch ditto	120	0	0
Ditto, for 40 ditto, 8 inch ditto	135	0	0

REPAIRS TO BRASS PUMPS.	3 inch.		3½ inch.		4 inch.	
	s.	d.	s.	d.	s.	d.
128. Working box with brass clacks complete, including leathers...each	10	0	12	0	14	0
129. Brass clacks and leathers for ditto ....each	1	6	1	10	2	3
130. Cupped leather for buckets „	2	6	2	9	3	0
131. Taking down, cleaning and oiling the works and putting together again ....each	7	6	8	6	9	6
132. Brass buckets and suckers fixed with all complete, including leathers, clacks, keys, collars and tow...each	8	6	10	9	13	0

	s.	d.
133. Gun metal or copper jump rods, turned, including brass couplings, collars or nuts and fittings, put to work.. each per lb.	2	9
134. New clothing to stuffing boxes......... „	1	6
135. Flanges or joints to hydraulic engines or lift pumps, opened and closed, labour only.........each single joint	1	0
136. Add half the price in wells 50 feet deep.		
137. Add three-fourths the price in wells from 50 to 100 feet deep.		
138. Add double the price in wells more than 100 feet deep.		
139. Repairs to pillar pumps, brass bucket with leathers and clack complete, for 3½ inch pumps...each	15	6
140. Ditto, ditto, 4 „ ... „	17	6
141. Brass sucker, all complete 3½ „ ... „	8	6
142. Ditto, ditto, 4½ „ ... „	11	0
143. New leathering bucket, including clack ...... „	4	3
144. New clack, only to bucket or sucker .... „	1	3
145. Steel bushing eyes to tops of rods ....per set	2	6

Table XIII.—*continued.*

Plumber's Work, Labour—Repairs, Valves.

	½ inch.		¾ inch.		1 inch.	
	s.	*d.*	*s.*	*d.*	*s.*	*d.*
146. Fixing bib cocks with one soldered joint, including balls ....each	1	1	1	5	1	10
147. Fixing stop-cocks with two soldered joints .... „	1	9	2	5	3	2
148. Drilling cisterns for cocks ...... „	0	9	0	10	1	0
149. Grinding old cocks water tight, including new plugs, common water way .... „	1	10	3	0	4	3
150. Boiler screws .... „	1	2	1	6	2	6
151. Ditto, ditto, with double nuts „	1	4	2	0	3	3
152. Boiler screws extra long......... „	1	4	2	0	3	0
153. Union joints for lead pipes fixed, including soldered joints .... „	2	4	3	3	4	5

	1¼ inch.		1½ inch.		2 inch.	
	s.	*d.*	*s.*	*d.*	*s.*	*d.*
Fixing bib cocks with one soldered joint including balls.......................each	2	4	2	10	3	10
Fixing stop-cocks with two soldered joints .... „	4	0	4	10	6	6
Drilling cisterns for cocks .... „	1	2	1	4	1	6
Grinding old cocks water tight, including new plugs, common water way .... „	5	8	7	2	9	9
Boiler screws .... „	3	3	4	9	7	6
Ditto, ditto, with double nuts......... „	4	0	5	0	9	0
Boiler screws extra long .... „	4	0	5	6	11	0
Union joints for lead pipes fixed, including soldered joints............... „	6	0	8	6	10	0

	1 inch.		1½ inch.		2 inch.		3 inch.	
	s.	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*
154. Brass valves, spindle ...each	2	0	3	6	5	6	12	0
155. Ditto, long spindle ...each	2	9	4	8	7	0	15	6
156. Ditto, with screws, nuts, and unions for cisterns ...each	6	0	10	6	17	0	40	0

Table XIII.—*continued.*

Plumber's Work—Copper Work in Lightning Conductors.

	1 inch.		1½ inch.		2 inch.		3 inch.		4 inch.	
	s.	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*
157. Washers, wastes for lead cisterns ......each	2	0	3	6	5	6	15	0	30	0
158. Ditto, with screws and nuts for iron or slate cisterns ......each	4	0	7	0	11	6	24	0	42	0
159. Ditto, with unions for slate cisterns...each	5	3	9	0	14	6	...		...	
160. Washers and plugs each	2	0	3	6	6	0	15	0	30	0
161. Ditto, with screws and nuts for iron or slate cisterns ......each	4	0	7	0	11	6	24	0	42	0
162. Ditto, with unions for slate cisterns...each	5	3	9	0	14	6	...		...	
163. Add for fixing all included ....each	1	3	1	9	2	3	4	0	6	0

COPPER WORK IN LIGHTNING CONDUCTORS.

(All fixed.)

	s.	*d.*
164. Copper tubes, 1 inch outside diameter and ⅛ of an inch thick, including all screw and socket ends and connexions ....per lb.	2	3
165. Copper bands to curve of ridge roll ⅛ of an inch thick, and any required width, including all necessary connexions with rivets and underplate ....per lb.	2	0
166. Copper bands, flat in underground conductors, ⅛ inch thick, and of any required width, including connexions ....per lb.	1	10
167. Copper eaves, 6 inches in diameter, weighing 1¾ lbs. per foot lineal, including all stays and brackets for fixing ....per lb.	2	0
168. Solid round copper spindles or rods ½ inch diameter, with screw and socket at one end and pointed at the other ....per lb.	1	11
169. Copper stack pipes, 4 inches in diameter, weighing 2 lbs. per foot run ....per lb.	1	11

TABLE XIII.—*continued.*

Plumber's Work—Copper Work in Lightning Conductors—Leadwork.

		s.	d.
170. Copper heads and shoes for the above stack pipes	per lb.	2	0
171. Copper holdfasts for fixing tubular conductors	„	1	8
172. Screw connexions or unions of copper, when used separate from the flat or tubular conductors ..	per lb.	1	11
173. Copper rivets	„	1	9
174. Sheet copper cut to pattern	„	1	7

LEADWORK.

175. Milled sheet lead..............................	per cwt.	44	6
176. Add for cutting to dimensions	„	2	0
177. Laying and fixing ditto, including nails and labour, but exclusive of any soldering	„	3	0
178. For ditto with old lead	„	6	0
179. Soldering joints, 1½ lbs. solder per foot,	per foot run	1	5
180. Ditto 2 lbs. solder per ditto	„	1	9
181. Close nailing to sheet lead with copper nails	„	0	4
182. Ditto, with iron nails	„	0	2½
183. Lead for cramping..........................	per cwt.	22	6
184. Drawn lead pipes	„	27	0
185. Soldered rain-water pipes	„	33	0
186. Heads to rain-water pipes.................	„	33	0
187. Labour in fixing pipes	„	3	0

	WATER PIPES.					
	¾ inch.		1 inch.		1¼ inch.	
	s.	d.	s.	d.	s.	d.
188. Soldering joints on new lead pipes, all included .... each	1	0	1	3	1	6
189. Tinning ends of pipes for jointing each	...		1	9	1	11
190. Jennings' patent joints for connecting pipes without the aid of fire or solder................................each	2	0	2	6	0	3

	WATER PIPES.					
	1½ inch.		2 inch.		2½ inch.	
	s.	d.	s.	d.	s.	d.
Soldering joints on new lead pipes, all included .... each	1	9	2	3	2	9
Tinning ends of pipes for jointing...each	2	0	2	6	3	0
Jennings' patent joints for connecting pipes without the aid of fire or solder each	3	6	4	0	4	6

TABLE XIII—*continued.*

Plumber's Work—Zincwork.

	Socket Pipes.					
	3 inch.		4 inch.		5 inch.	
	s.	*d.*	*s.*	*d.*	*s.*	*d.*
Soldering joints on new lead pipes, all included .... each	2	0	2	6	3	0
Tinning ends of pipes for jointing...each	2	8	3	4	4	0
Jennings' patent joints for connecting pipes without the aid of fire or solder each	6	0	7	6	...	

191. Laying and jointing cast iron pipes, yarn, lead and everything included, in 6 feet lengths, for 1½ inch bore per 6 feet length	1	0
192. Ditto, ditto, ditto for 2 inch bore „ „	1	3
193. Ditto, ditto, ditto, in 9 feet lengths, for 3 in. bore per 9 feet length	2	0
194. Ditto, ditto, ditto, for 4 in. „ „ „	2	5
195. Ditto, ditto, ditto, for 5 in. „ „ „	3	0
196. Ditto, ditto, ditto, for 6 in. „ „ „	3	5

ZINCWORK.	16 oz. per foot super.		21 oz. per foot super.		26 oz. per foot super.	
	s.	*d.*	*s.*	*d.*	*s.*	*d.*
197. Zinc laid complete on flats, the dimensions of the rolls to be taken in measuring the lengths... per ft. super	0	4½	0	6	0	7¼
198. Ditto in verandahs ... „	0	5½	0	7¼	0	8¾
199. Ditto in conical roofs.. „	0	6½	0	8¼	0	9¾
200. Ditto flashing in lieu of lead „	0	7	0	8¾	0	10¼
201. Zinc semicircular eaves gutters, 5 inches in diameter, fixed complete per foot run	0	4½	0	6	0	7¼
202. Zinc rain-water pipes, 3 inches diameter, fixed complete... per foot run	0	3½	0	4½	0	5½
203. Heads to 3-inch rain-water pipes, O.G. pattern ....each	...		3	0	...	
204. Shoes to 3-inch ditto ....each	...		1	6	...	

MATERIALS.

Brass screws, per lb., 2*s.* 4*d.*; brass chain, per lb., 2*s.*; brass cocks of large size, brass clamps, large washers, per lb., 1*s.* 9*d.*; cast iron in pipes for pumps, per cwt., 12*s.*; copper nails, cast, per lb., 1*s.* 3*d.*; copper nails, cut, per lb., 1s. 3d.; copper nails,

TABLE XIII.—*continued.*

wrought, per lb., 2*s.* 6*d.*; copper screws, bolts, and nuts, per lb. 2*s.*; copper wire, per lb., 1*s.* 6*d.*; copper gratings, per lb., 1*s.* 8*d.*; copper air vessels, per lb., 1*s.* 10*d.*; copper, sheet, cut to figure, per lb., 1*s.* 4*d.*; currier's dubbing, per quart, 1*s.* 10*d.*; India-rubber flanges for pipes, per lb., 7*s.*; iron cement, per lb., 5*d.*; leather for buckets, suckers, &c., per lb., 2*s.* 3*d.*; lead-headed nails, per lb., 8*d.*; rope yarn, per lb., 6*d.*; rosin, per lb., 1½*d.*; sal ammoniac, per lb., 10*d.*; spirits of salts, per quart, 2*s.*; solder, ⅓ tin and ⅔ lead, per lb., 8*d.*; solder ⅔ tin and ⅓ lead, per lb., 1*s.* 1*d.*; tallow, per cwt., 60*s.*; tin, in ingots, per cwt., 120*s.*; tow, per lb., 4*d.*; zinc in sheet, per cwt., 37*s.*

TABLE XIV.

GAS FITTINGS.

Pipes—Cast Iron, Spigot and Faucet, including all digging to a depth not exceeding 2 feet below the surface, filling, ramming, laying and jointing, lead and yarn and every other necessary; fitting, fixing and entire completion, everything included, except taking up and relaying paving or pavement.

	INTERNAL DIAMETER OR BORE.					
	2½ inch.		2 inch.		2½ inch.	
Weights per length	31 lbs.		48 lbs.		98 lbs.	
	s.	*d.*	*s.*	*d.*	*s.*	*d.*
1. Cast iron pipes in 6 feet lengths including one lead joint to each length per yard lineal	2	2	2	6	3	4
2. Ditto in 9 feet lengths including one lead joint to each joint ...per yd. lineal	...		2	4	3	0
3. Add for additional joints ....each	0	10	1	0	1	2
4. Ditto socket branches of same thickness of metal as the pipes to which they are connected ....each	5	0	6	0	7	6
5. Cast iron T's of ditto............... „	3	6	4	9	6	6
6. Ditto bends and elbows ditto ... „	3	0	4	0	5	6
7. Caps, collars and plugs to ditto „	2	0	2	6	3	0
8. Cast iron spigot flanges and sockets „	...		2	9	3	3
9. Digging, filling and ramming below the above specified 2 feet; for every additional foot, add per 12 yds. lineal	1	3	1	3	1	3

TABLE XIV.—*continued.*

Gas Fittings.

	INTERNAL DIAMETER OR BORE.					
	3 inch.		4 inch.		5 inch.	
Weights per length	112 lbs.		140 lbs.		224 lbs.	
	s.	*d.*	*s*	*d.*	*s.*	*d.*
Cast iron pipes in 9 feet lengths including one lead joint to each joint per yard lineal	3	6	4	3	6	6
Add for additional joints ....each	1	5	1	8	2	2
Ditto socket branches of same thickness of metal as the pipes to which they are connected ....each	10	6	13	0	16	0
Cast iron T's of ditto .... „	8	3	11	6	14	0
Ditto bends and elbows ditto ...... „	7	9	10	6	13	0
Caps, collars and plugs to ditto ...... „	3	9	4	6	5	3
Cast iron spigot flanges and sockets „	4	3	5	9	6	9
Digging, filling and ramming below the above specified 2 feet; for every additional foot......add per 12 yards lineal	1	4	1	4	1	4

Cocks, Valves, Connexions, Wrought Iron Welded Pipes, Sockets, Burners, including fittings, jointing, and fixing, all complete.

	¼ inch.		⅜ inch.		½ inch.		¾ inch.	
	s.	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*
10. Brass cocks, brackets for, of iron..........................each	...		3	0	4	0	5	3
11. Ditto, ditto, pillar lantern, straight..................... each	...		1	3	1	6	1	10
12. Ditto, ditto, elbows...... „	...		1	8	1	10	2	3
13. Ditto, ditto, L swivel from iron .... each	...		3	6	3	9	4	1
14. Ditto, ditto, main ...... „	...		2	4	2	7	3	4
15. Ditto, ditto, screwed from barrel .... each	1	6	1	9	2	0	3	0
16. Ditto, brass, pillar or pendant for, iron .... each	...		1	6	1	9	2	6

TABLE XIV.—*continued.*

Gas Fittings.

	¼ inch.		⅜ inch.		½ inch.		¾ inch.	
	s.	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*
17. Cup and ball joints, brass, with ceiling plates ...... each	...		...		5	3	7	0
18. Union joints for metal pipes, brass .... each	0	6	0	9	1	0	1	3
19. Ditto for iron pipe ... each	...		1	0	1	3	1	9
20. Ditto for steam pipe, extra strong .... each	...		...		1	9	2	9
21. Lambert's globular high pressure steam valve .... each	...		...		5	6	7	0
22. Gun metal steam cocks, or with throttle valves ...... each	...		...		4	6	7	3
23. Gas main cocks, with metal plug and spanners......... each	...		...		3	0	4	9
24. Iron cocks screwed to barrel with spanners .... each	2	0	2	2	2	5	3	0
25. Wrought iron welded pipe, per foot	0	3	0	3½	0	4	0	4½
26. Connecting pieces, long screws .... each	0	7	0	8	0	9	0	10
27. Elbows, bend, and springs, each	0	6	0	7	0	7½	0	9
28. Tees .... ,,	0	6	0	7	0	8	0	10
29. Crosses .... ,,	0	9	1	0	1	3	1	6
30. Sockets, and plugs, and nuts, each	0	3	0	4	0	5	0	6
31. Fish-tail gas burners, Nos. 1, 2, and 3, or bat's wing ... each	0	1	0	1	0	1	...	
32. Plain brackets, single joints, with cock and cover plate, 18″ × 12″ .... each	...		4	0	4	6	7	6
33. Brackets, double jointed, 12 to 18 inches long .... each	...		7	3	8	3	13	0
34. Ditto, or the above with universal joint.................. add	...		3	6	4	0	6	0
35. Flexible tube pipe, with glazed surface .... per foot	...		0	6	0	8	1	6

TABLE XIV.—*continued.*

Gas Fittings.

	1 inch.		1¼ inch.		1½ inch.		2 inch.	
	s.	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*
Brass cocks, brackets for main, each	8	0	12	3	20	0	35	0
Ditto, ditto, screwed from barrel, each	4	0	6	6	8	0	14	0
Ditto, brass, pillar or pendant for, iron, ... each	3	6	4	9	...		...	
Cup and ball joints, brass, with ceiling plates, ... each	12	0	...		...		...	
Ditto, for iron pipe .... each	2	9	4	9	5	9	10	0
Ditto, for steam pipe, extra strong, ... each	4	0	6	0	7	6	11	0
Lambert's globular high pressure steam valve, ... each	11	0	15	0	20	0	30	0
Gun metal steam cocks, or with throttle valves, ... each	10	9	15	6	23	0	40	0
Gas main cocks, with metal plug and spanners, ... each	6	0	10	0	16	0	22	0
Iron cocks, screwed to barrel with spanners .... each	4	9	7	6	10	0	17	0
Wrought iron welded pipe per foot	0	6	0	9	1	0	1	6
Connecting pieces, long screws, each	1	0	1	9	2	3	3	6
Elbows, bend, and springs... „	1	0	1	9	2	3	3	6
Tees .... „	1	2	1	9	2	3	3	6
Crosses .... „	2	0	2	7	3	2	4	6
Sockets, and plugs, and nuts, each	0	7	0	9	0	11	1	2
Flexible tube pipe, with glazed surface ....per foot	2	10	...		...		...	

	s.	*d.*
36. Brackets, 8 feet long, extra strong, with strong back plates for 4 bolts, strong universal joint at back, universal swivel joint at the end, cocks, burners, and bolts complete .... each	40	0
37. Cast iron wall box for supporting extra strong bracket .... each	5	0

TABLE XIV.—*continued.*

Gas Fittings.

		s.	d.
38.	Common double-jointed brackets, 3 feet long, 3 strong back plates for 3 bolts, swivel joints at the back, universal arms at the end, cocks, burners, and bolts complete .... each	15	0
39.	Common single-jointed wall brackets, with swivel joints at the back, cocks and finger elbows complete each	7	0

Patent Cast Iron Wet Gasometers.

		£	s.	d.			£	s.	d.
40.	2 light	1	8	0	47.	50 light	15	10	0
40A.	3 ditto	1	10	6	48.	80 ditto	24	0	0
41.	4 ditto	1	16	0	49.	100 ditto	30	0	0
42.	6 ditto	3	3	0	50.	140 ditto	33	10	0
43.	10 ditto	4	4	0	51.	200 ditto	38	0	0
44.	16 ditto	5	5	0	52.	240 ditto	43	0	0
45.	24 ditto	7	7	0	53.	300 ditto	52	0	0
46.	30 ditto	11	11	6					

Patent Wrought Iron Wet or Dry Gasometers.

		£	s.	d.			£	s.	d.
54.	3 light	2	4	0	59.	45 light	8	10	0
55.	5 ditto	2	10	6	60.	60 ditto	11	10	6
56.	10 ditto	3	7	6	61.	80 ditto	14	10	0
57.	20 ditto	4	6	6	62.	100 ditto	18	0	0
58.	30 ditto	5	15	0	63.	150 ditto	26	10	0

Stocks, Dies, and Taps for Iron Pipes.

				£	s.	d.
64.	For ¼ in., ⅜ in. iron tube	with 4	taps	1	1	0
65.	„ ¼ in., ⅜ in., ½ in. ditto	„ 6	„	1	11	0
66.	„ ¼ in., ⅜ in., ½ in., ¾ in. ditto......	„ 8	„	2	6	6
67.	„ ½ in., ¾ in. ditto.....................	„ 4	„	2	0	0
68.	„ ½ in., ¾ in., 1 in. ditto	„ 6	„	3	3	0
69.	„ 1 in., 1¼ in., 1½ in. 2 in. ditto ...	„ 8	„	7	17	0
70.	„ 1¼ in., 1½ in., 2 in. ditto	„ 6	„	8	0	0

Stocks, Dies, and Taps for Brass Tubes.

			£	s.	d.
71.	For ⅜, ½, ⅝, and ¾ inch	per set	1	6	6

SPECIFICATION

FOR PERMANENT WAY.

No. I.

Timber Cross Sleepers, and the Contractor's or the Vignoles' Pattern Rail; Single Line of Way, about 20 *feet formation,* 5 *feet* 6 *inches gauge. Sleepers; Ballast; Manufacture of Rail, Fishing Plates, Bolts, Nuts, and Dog-Spikes.* (*See Plates.*)

The Sleepers to be provided for the permanent way shall be 10 feet long by 10 inches by 5 inches, roughly squared; the joint sleepers shall be 12 inches by 6 inches; the average spaces from centre to centre of sleeper shall be 3 feet, except on steep inclines, where they are to average 2 feet from centre to centre. All the timber used must be of a durable character, and such as is fully approved of in the country for the purposes of construction; such as the best satin-wood, iron-wood, jack, ebony, &c.; and no timber must be brought upon the work that is not fully approved of by the engineer. It may be necessary, in order to open a portion of the railway as soon as possible, that the contractor should be allowed to use for the first length of line to be laid continuously, (say) 30,000 sleepers of the best Baltic fir, instead of the above-named woods. On this point special instructions will be given by the Engineer, and in the event of such sleepers being used, they shall be thoroughly creosoted under a particular specification, and to the extent of 10 lbs. of creosote per cubic foot of timber.

The Ballast shall be broken stone, well cleaned cabook gravel or river ballast, 2½ cubic yards per yard lineal,

Specification for Permanent Way, No. I.—continued.

and coarse clean sand may be allowed for the bottom ballast to one-third of the total depth.

The Rail will be 72 lbs. per yard, of the Contractor's form or Vignoles' pattern, with an adequately broad base, according to the template to be examined with this specification in the Engineer's office, and to which the rails must all be accurately rolled.

No rails will be received varying more than 1 lb. per yard from the weight determined on. The length of rail to be 21 feet, but with such proportions of 18 and 15 feet lengths as may from time to time be ordered. No variation from the lengths determined on exceeding one-eighth of an inch will be allowed.

The entire mode of manufacture, as well as the quality and mode of preparation of the iron used, shall be such as the Engineer shall decide and fully approve as calculated in his opinion to produce rails of the best quality.

Each rail is to be made from a pile not less than 9 inches high by 8½ inches broad, and containing not less than one-third of its whole weight of No. 2 iron. The disposal and dimensions of the bars in the pile will be hereafter determined by the Engineer. All the bars are to be of uniform section, and in whole lengths, no short or irregular-shaped pieces, scraps or rough ends of bars being used.

The pile is to be rolled at a welding heat into a bloom of about half the original sectional area, which being again raised to a welding heat is to be rolled into the rail.

The manner of making of the No. 2 iron to be used in the pile must be such as to be approved of by the Engineer. Each slab or bar must be worked at two heats, and the pile from which it is formed must be of large size and contain only perfect bars.

The Engineer is to have the power of altering the

Specification for Permanent Way, No. I.—continued.

arrangement of the rail pile, or the general method of manufacture during the progress of the contract in any way he may consider expedient or advisable in his opinion, it being however understood that he shall not increase the proportion of No. 2 iron used.

The quality of the finished rail as regards toughness, strength, shape, and finish, shall be such as is satisfactory to the Engineer, who shall have power to test the same in any manner he may think suitable, and at the Contractor's expense.

The whole of the rails must be of uniform section throughout, and perfectly true and straight, and any that are bent or warped during the manufacture must be straightened by pressure and not by hammering. They shall be perfectly sound and free from cracks, flaws, splits, scoriæ, imperfect welds, or defects of any kind; and the ends shall be cut accurately square and true.

Each rail is to be stamped on the side distinctly with the maker's name, and the month and year of the manufacture, and the initials of the railway company.

Holes shall be drilled in the rails in such positions as shall be determined by the engineer, either for holding down the rails, for fishing, or for any other purpose; any variation of more than 1-32 of an inch from the correct sizes or positions of the holes, will render the rail liable to be rejected.

All labour and assistance, tools, gauges, apparatus, &c., which the Engineer may require for the purpose of testing, inspection of, weighing or gauging the rails, or for the purpose of otherwise satisfying himself of the due performance of the conditions of the contract, shall be provided by the Contractor, free of charge, either at the works or at the place of shipment, or both, as may be required by the Engineer.

The Contractor will be required to enter into a guarantee to supply, free of charge, new rails to the

Specification for Permanent Way, No. I.—continued.

extent of any which may be certified by the Engineer to have failed, from defective quality of material or of manufacture, at any time not exceeding two years from the time of opening for public traffic of that portion of the railway on which they are laid.

The Fishing plates are to be ¾ inch thick, of a section to fit the under side of the head and upper side of the flange of the rail.

A correct template will be furnished to the Contractor, and the plates, when finished, must exactly correspond therewith.

The plates are to be sixteen inches long, and must be sawn off square without burrs or deformities at the ends.

They are to be perfectly straight and smooth on every surface, free from twist, and of uniform section throughout.

The description of pile for rolling the fishing plates, and the kind of material used therein, shall be such as are satisfactory to the engineer, and must be specially sanctioned by him.

The quality of iron in the finished fishing plates shall also be subject to his approval, and they shall be submitted to such test as he may think necessary, and at the contractor's expense.

Each plate must be drilled with four square holes, of such dimensions and placed in such positions as the Engineer will direct.

These holes must be clean and true, square through the plate, and exactly in the centre of the breadth, free from burrs on either side, and perfectly accurate in size and position. The manner of making the holes shall be such as to be approved by the Engineer.

After the holes are made, every fishing plate is to be heated and immersed in boiled linseed oil.

The patent right must be paid by the Contractor.

The Bolts will be ¾ inch thick, and 3½ inches long, from the under side of the head, which will be half-round.

Specification for Permanent Way, No. I.—continued.

They must be square for half an inch under the head. The *Nuts* will be square.

The bolts and nuts must exactly correspond, both in make and dimensions, with patterns to be deposited with the Engineer, and duplicates of which will be furnished to the Contractor. They are to weigh one pound each.

The iron is to be of a strong fibrous quality, equal to "best" Staffordshire, and shall be specially subject to the approval of the Engineer.

The method of manufacture, whether by machinery or by hand, shall be such as the Engineer shall approve.

The bolts are to be made from square iron, swaged down, and the heads are to be worked out of the solid, and not welded on.

The workmanship and finish must be fully equal to that of the patterns; the forging is to be perfectly sound, square, and true, especial care being taken that the internal faces of the head and nut are exactly square with the axis of the bolt.

The thread is to be Whitworth's standard, to be clearly cut, and to hold full to within two inches of the head. The nut is to fit so tight upon the bolt that it cannot be moved without a spanner.

The bolt, when screwed, must pass freely up to its head, into a hole 13-16 of an inch square.

The bolts and nuts are to be well oiled, and packed in good strong cases, well secured, and fit for a sea voyage.

The Dog Spikes are to be 6 inches long and ¾ inch square, with a wedge point. The head to be 11-16 deep, and to project half an inch over the flange of the rail, with ears of ⅜ in. by 11-16, projecting ⅛ in. at each side of the head.

The spikes must correspond in make and dimensions with patterns, to be deposited with the Engineer, and a duplicate of which will be furnished to the Contractor.

They shall be made from iron of a strong fibrous

Specification for Permanent Way, No. I.—continued.

quality, and so tough that the head when hammered cold shall bend and not break off with a brittle fracture.

The head is to be worked out of the solid, and neatly formed. The workmanship throughout is to be fully equal to that of the pattern.

The dog spikes are to weigh 2500 to the ton, or $\frac{8}{10}$ lb. each. They are to be packed in strong casks well secured.

SPECIFICATION OF PERMANENT WAY.—
No. II.

Gauge of Railway, 4 *feet* 8½ *inches. Double-headed Rails on cast-iron Chairs. The manufacture of Rails, Fishing-plates, Fish-bolts and Nuts, Spikes, Chairs, and Wood Keys. Crossings: manufacture of Points and Wing Rails, and Switches.* (*See Plates.*)

The Rails are to be of the form known as double-headed or double T. A template of the form of rail required will be supplied to the Contractor, and the rails must be made exactly thereto.

The weight of the rails is to be 74 lbs. per yard. The length of the rail is to be 21 feet, but, for the convenience of the manufacturers, a quantity, not exceeding 5 per cent., will be received 18 feet long. It is to be understood that these shorter rails are to be cut from longer ones, that are imperfect at the ends. No variation exceeding one-tenth of an inch in length, or one per cent. in weight, will be allowed.

The rail is to be rolled from a pile 8½ inches wide and 9¼ inches deep. This pile is to consist of a top and bottom slab, and, intermediate to these, of layers of puddle bars. The top and bottom slabs are each to be

Specification for Permanent Way, No. II.—continued.

of the uniform thickness of at least 2 inches, and are to be of the whole width of the pile, and they are to be precisely similar in every respect.

The intermediate puddle bars are to be ¾ inch thick, of two unequal widths (together equal to the whole width of the pile), so as to break joint. The top slab and bottom slab, and the intermediate puddle bars, are to be of the whole length of the pile.

The top and bottom slab in the pile must always be of sufficient dimensions to form together fully 44 per cent. of the whole quantity of iron in the pile. Each slab is to be made in one of the following modes—viz., 1st, of a bloom consisting of two puddle balls thoroughly worked together under a five-ton tilt hammer, wrought on all sides, and thoroughly upset in all directions at the ends as well as at the sides and reduced to a compact form and finished by rolling to the required size of the rail pile. Should any puddle ball break asunder under the hammer, it is to be rejected and cast aside; or 2ndly, the top and bottom slab must be formed in the following manner:—The puddle balls are to be reduced by rolling into bars not thicker than ¾ of an inch of two unequal widths (together equal to the whole width of the pile) so as to break joint. A pile 8 inches wide and 9 inches high is to be formed of these bars, each bar to be of the whole length of the pile; this pile is to be heated to a welding heat, and reduced by rolling to a bloom 6 inches wide by 7 inches high; this bloom is to be reheated to a welding heat, and rolled into the slab of the dimensions before specified.

All the surfaces of the slabs are to be clean, smooth, and regular, free from cinder, cracks, flaws, or other defects.

The rail pile is to be rolled or hammered at a welding heat into a solid bloom 5 inches wide and 6 inches deep,

Specification for Permanent Way, No. II.—continued.

which is again to be raised to a welding heat and rolled into the rail.

The Engineer is to have the power of altering the arrangement of the pile, or the method of manufacture during the progress of the work, in any way expedient or desirable in his opinion; it being, however, understood that he shall not increase the proportion of iron in the top and bottom slab.

The quality of the finished rails as regards toughness and strength, shall be such as shall be satisfactory to the Engineer; they must be of uniform section throughout, and perfectly true to the template. They must be straight and sound, free from splits, cracks, flaws, scoriæ, imperfect welds, or defects of any kind; and the ends are to be cut perfectly true and square.

Each rail is to be stamped on one side distinctly and in suitable characters with the maker's initials, the month and year of manufacture, as also with the initials of the railway company, and the weight per yard of the rail.

The rails will be required to have two round bolt holes made at each end for the fishing plates. These holes must be clean and without burrs on either side, square through the rail, and placed exactly in the proper position, as shown in the drawing.

Any variation from the positions, or from the correct sizes of the holes, will render the rail liable to be rejected. If any difficulty is found or defect created by punching any of these holes, then they are to be drilled.

The Fishing-plates are to weigh 11lbs. each, and must exactly correspond in every respect with a template which will be furnished to the Contractor.

They are to be sawn off square without burrs or deformities at the ends, they are to be perfectly straight and smooth on every surface, free from twist, and of uniform section throughout.

The fishing-plates are to be made from the best,

Specification for Permanent Way, No. II.—continued.

toughest, and strongest description of No. 2 iron, such as shall be satisfactory to the Engineer, or of such iron as shall be specially approved and sanctioned by him.

One half of the fishing-plates are to be pierced each with four round holes, and the other half each with four square holes; these holes are to be respectively 1 inch diameter and 1 inch square.

The holes must be clean and true, square through the plate, free from burrs on either side, and perfectly accurate in size and position.

Any variation from the proper positions or from the correct sizes of the holes will render the plate liable to be rejected.

After the holes are made every plate is to be heated and immersed in hot boiled linseed oil, and every care must be taken to do this before any oxidation whatever sets in.

Each fishing-plate is to be stamped distinctly with the month and year of manufacture, and the initials of the railway company.

The Fish Bolts are to be $\frac{7}{8}$ of an inch diameter with a $\frac{7}{8}$ of an inch square neck, the length of the neck being $\frac{3}{4}$ of an inch measured from the under side of the head.

The bolts are to be formed from 1-inch square bars. The heads are to be round, and are to be worked out of the solid, and not to be welded on.

The Nuts are to be square and fit tight upon the bolts. The forging is to be perfectly sound and true, and the threads are to be Whitworth's standard, to be cleanly cut, and to hold full within a distance of $2\frac{1}{4}$ inches from the under side of the head.

The bolts and nuts are to be made of the very best and toughest Staffordshire iron, samples of which are to be furnished to the Engineer and to be approved by him. The iron will be tested from time to time in any

Specification for Permanent Way, No. II.—continued.

manner the Engineer may consider desirable. Every bolt and nut, when finished, is to be heated and immersed in hot boiled linseed oil before any oxidation whatever commences.

The Spikes must exactly correspond in make, form, and dimensions, with a sample which will be supplied to the Contractor; the heads are to be worked out of the solid and not to be welded on. The instant every spike is finished, and whilst quite hot, it is to be immersed in hot boiled linseed oil; if the spike is not sufficiently hot, it is to be reheated, and if any oxidation whatever takes place the spike will be rejected.

The Chairs (excluding the switch and crossing chairs) are to weigh 25 lbs. each. In the manufacture of all the chairs, particular attention is to be paid to the size and form of the opening for the rail.

Templates and gauges will be supplied to the Contractor, and which must be accurately worked to. Standard gauges will also be furnished for the size and form of the spike-holes, which are to correspond exactly therewith, and are to be cast perfectly true and clean. They are to be countersunk on the bottom side.

The tilt or inward inclination of the rail, when keyed up in the chair, is to be 1 in 24, equivalent to an angle of about 2½ degrees from the vertical when the chair is standing on a level bed. Great attention must be paid to the accuracy of the tilt, and if, on applying a gauge of the correct angle it shall be found to touch only one of the edges of the rail, and to be more than 1-16 of an inch distant from the other edge, the chair in such case will be rejected.

The chairs are to be cast from the cupola second melting. The mixture of the metal will be left to the Contractor's own judgment, but it must be of such quality as the Engineer shall approve, and in respect of strength must stand the following test:—Two bars are to be cast

Specification for Permanent Way, No. II.—continued.

each day, 3 feet 6 inches long, 1 inch broad and 2 inches deep.

The person appointed to inspect the chairs will then test one of these by placing it edgewise on bearings 3 feet apart and loading the middle of the bar, and should it break with any weight less than 27 cwt., all the chairs cast with that metal are to be rejected. The other test-bar is to be marked with the date of the cast and put away for the future inspection of the Engineer.

The month and year of manufacture, the initials of the railway company, and the weight of the rail to be used with the chair, are to be distinctly cast in a suitable place on each ordinary chair.

The Wood Keys are to be similar in form and dimensions to patterns which will be supplied to the Contractor. They are to be made of the very best sound English heart oak, free from shakes, knot, sap, or other defects, and it is to be expressly understood that the timber used shall be subject at all times to the special approval of the Engineer.

The wood used in making each separate key is to be riven or sawn lengthwise of the grain, and before being converted into the finished key, is to be thoroughly desiccated by dry heat or by any other means the Engineer may desire. The keys are to be kept in a perfectly dry place, and, after an interval of 21 days from the date of their manufacture, each key will be separately gauged by the person appointed by the Engineer to watch the manufacture, and all that vary more than 1-40th of an inch in thickness from the required dimensions will be rejected.

The whole of the articles are to be of the very best quality, and the workmanship throughout is to be of first-class character. All articles are to be submitted for examination by the Engineer on the premises of the Contractor, and must not on any account be sent away

Specification for Permanent Way, No. II.—continued.

before receiving such examination; and the Contractor must give at least one week's notice in writing to the Engineer previous to any of the work being ready for inspection.

All articles which may appear to the Engineer to be inferior or defective in make or quality, or not to be in accordance with this specification, will be rejected. The contract is to be executed in every respect to the satisfaction of the Engineer, and his decision on all points of dispute that may arise shall be final and binding on all parties.

All labours and assistance or apparatus the Engineer may require for testing, inspecting, or gauging in any way and at any time he may think proper, must be provided by the Contractor free of charge.

Packing.—The bolts and nuts, spikes and wood keys, are to be packed in strong iron-bound and air-tight casks or cases, as the Engineer may direct; all nails used in the casks or cases are to be hammered and not cut, and the dimensions of the casks or cases are to be such as the Engineer shall direct; the fish plates are to be in bundles, and in each bundle there shall be an equal number of plates with round holes and square holes.

Crossings (see Plates).—The point and wing rails of the crossings are to be of the form called "filled rails," and a template of this form will be supplied to the Contractor, and to which he will have to work, and the contract will include all that is requisite for the completion of the crossings.

The filled rails are to be of the best description made from cold blast iron, and approved by the Engineer as to the material, mode of manufacture, make and finish. The rest of the wrought iron is to be of the best hammered scrap, and the steel is to be the very best blistered.

The cast iron is to be a strong and good mixture of metal approved by the Engineer, and all the castings

Specification for Permanent Way, No. II.—continued.

must be sound, sharp, clean, and free from flaws or defects of any kind whatever.

The whole of the workmanship and all the materials used shall be of the very best quality, and subject to the special approval of the Engineer.

One crossing is to be made and fitted up complete, to be submitted to and approved by the Engineer before any more of the work is commenced.

The crossings are all to be fitted in the most accurate manner, and are to be put together complete for inspection on the Contractor's works. The point rails must be soundly and securely welded together in a manner sanctioned by the Engineer; a thoroughly sound and solid surface is to be given to the point the whole distance from the place where the two rails first meet to the point. The point must be steeled for a distance of 1 foot 6 inches from the nose; the steel to be ½ inch thick at the wide end, increasing to 1 inch at the nose; the steel is to be welded on in short lengths, and after steeling the point is to be planed up.

The wing rails are to be steeled with ½-inch blistered steel for a distance of 2 feet.

The various parts of the crossings are all to be properly marked and numbered before being taken to pieces, so that they may be readily fitted together again when required. Every separate part of each set shall bear the distinctive number of the set to which it belongs marked in white paint, and all the parts are to have the railway company's initials stamped, cast, or marked upon them in distinct and permanent characters and in suitable places; the distinguishing letter of the chair and the angle of the crossing are to be marked on the crossing and cast on the chair. As soon as completed the whole of the work to be thoroughly cleaned and freed from all rust, then heated and dipped in hot boiled linseed oil.

At least a week's notice to be given by the Contractor

Specification for Permanent Way, No. II.—continued.

to the Engineer as regards inspection of the crossings, which are on no account to be taken to pieces until they have been examined by the Engineer or his deputy, and the Engineer's written certificate only will be accepted as proof that the crossings are considered satisfactory. The Engineer shall have power to inspect the manufacture or works at any time he may think fit during their progress, and to reject any parts he may consider unsatisfactory, and the Contractor shall immediately replace these at his own expense.

Switches (see Plates).—The contract includes the supply and delivery of the whole of the rails, chairs, bolts and nuts, rods, lever-boxes, weights, pins, cotters, and all other parts and materials requisite for the thorough completion and working of the switches.

The stock and tongue rails of the switches are to be what are called "filled rails." Templates, gauges, or samples of the filled rails, fish plates, fish bolts and nuts, and nuts, keys and spikes will be supplied to the Contractor.

The filled rails are to be of the very best description, made from cold-blast iron approved by the Engineer, both as to material, mode of manufacture, make and finish; the rest of the wrought iron is to be of the very best hammered scrap. The cast-iron is to be a strong and good mixture of metal approved by the Engineer, and all the castings must be sound, clean, sharp, and free from flaw or blemish, and all the materials shall be of the very best quality.

The stock rail and tongue rail both made out of filled rails to correspond with the ordinary section; the houseing of the tongues to be planed up, the nose of the tongue to be afterwards rounded off; the solid stock rails to be planed out to house the tongues and to receive the ordinary fish plates for the joints. A slight bend must be given to the stock rail according as the switches are to be laid in for the right or left hand.

Specification for Permanent Way, No. II.—continued.

A set will consist of—

- Two stock rails.
- Two tongues.
- Two double chairs, right and left.
- Ten single slide chairs, one bolt to each.
- Two connecting rods.
- One level rod.
- Lever, lever-box and weight complete.

Approximate Weight of Switch Lever-box.

	cwt.	*qrs.*	*lbs.*
Cast-iron box and cover	1	0	23
„ axle	0	0	15
„ weights	0	3	20
Wrought-iron lever hanger, bolts, &c. .	0	0	19
Brasses for axles.	0	0	2

The switches are to be properly fitted in the best and most accurate manner; they are all to be put together complete for inspection on the Contractor's works.

It is to be observed that the hooks of the connecting rods can only be put in place when the tongues are fitted sideways, so that when the end of the tongue is in the heel chair, the connecting rod cannot be removed.

One set of switches is to be made and fitted up with levers, box, and rods complete, as a sample to be submitted to the Engineer, and this must be approved of before the remainder of the work is commenced.

The various parts are to be properly marked and numbered before being taken to pieces, so that they may readily be put together again in the proper manner, and every separate part of each set shall bear marked in white paint the distinguishing number of the set to which it belongs. The company's initials to be legibly stamped, cast, or marked upon every piece in permanent characters and in a suitable place.

The whole, as soon as completed, must be thoroughly

Specification for Permanent Way, No. II.—continued.

cleaned and freed from all rust, and then heated and dipped in hot boiled linseed oil. All the small parts of each set must be packed in extra air-tight cases, hooped round with one inch hoops ; all nails used in these cases are to be hammered and not cut.

As regards the inspection of the work and the reception of the same from the Contractor, the same regulations as above for the crossing will apply.

SPECIFICATION FOR TELEGRAPH MATERIALS.

Iron Poles and General Stores. Galvanized and Charcoal Wires; Pole-arms, Clips, Insulators, Stay Rods, &c.; Iron Poles for Rock and Ordinary Ground; Station Apparatus and Tools.

The contract includes the supply and delivery of such materials as are required in the construction of an electric telegraph, and as are enumerated in the schedule according to specification.

48 cwt. best best galvanized iron wire, No. 4 Birmingham wire gauge.

31 tons best best galvanized wire, No. 8 Birmingham wire gauge.

The Wire in the above to be highly annealed, and very soft and pliable. It is not required to possess great tensile strength, but must be capable of elongating 18 per cent. without breaking after being galvanized.

The wire is to be supplied in not less than 80 lbs. pieces, unless specially ordered otherwise ; it is to be warranted not to contain any weld, join or splice whatsoever, and to be free from all imperfections, flaws, sand splits, or other defects.

Specification for Telegraph Materials—continued.

The whole of the wire to be stretched by machinery 2 per cent., and to be carefully coiled so as to contain no bends or indentations, but to resemble newly-drawn wire in its straightness.

The whole will be subjected to any tests the Engineer may consider desirable, and will undergo a constant and minute inspection; for which purpose every facility and assistance must be afforded by the Contractor.

All bundles containing split or defective wire, or wire of wrong gauge, or which the Engineer or his inspector may consider defective, or in any way improper for use, will be rejected. If during the process of stretching more than 5 per cent. of the bundles break, crack, or show any defect, the whole of the bundles will be rejected.

If less than 5 per cent. break, the whole will be accepted; but the manufacturers are not to attempt to weld, join, or otherwise splice any of the broken wire, but it is to be delivered as it comes from the stretching machine. Each bundle to be delivered securely bound with wire, and marked with a tally.

2½ cwt. Galvanized *Annealed Charcoal Iron Wire*, No. 12 Birmingham wire gauge.

3½ cwt. Galvanized Annealed Charcoal Iron Wire, No. 16 Birmingham wire gauge.

This wire to be of the very best quality of charcoal iron wire. All bundles containing split, burnt, or defective wire, or wire of wrong gauge or inferior quality, or wire that will not sustain the usual tests for charcoal iron wire severely applied, or wire that shall not be cleanly or evenly galvanized, or of which the zinc coating will scale off in twisting, will be rejected.

The galvanized annealed charcoal iron wire to be delivered in bundles of 1¼ cwt., strongly bound with wire and marked with tallies, and carefully packed in strong matting.

Specification for Telegraph Materials—continued.

2½ cwt. solder.

The Solder to be made of equal quantities of the purest and best quality of new lead and block tin, melted together, and twice run on the floor into long thin strips.

2160 pole-arms, 24 inches × 2½ inches × 2½ inches.
87 pole-arms, 22 inches × 3 inches × 3 inches.

The Pole-arms to be made of the best seasoned teak, or other approved hard sound wood of equal quality, and to be formed according to the pattern supplied. The pole-arms are to be bored at 2¼ inches from each end, to receive the bolt of the insulators, and also with two holes to receive the clip that fixes it to the pole.

2300 galvanized iron clips for pole-arms.

The Galvanized-iron Clips, for pole-arms, to be made of the best Staffordshire iron, and according to pattern to be supplied to the Contractor. The screw threads to be carefully and well cut and the nuts properly fitted.

4800 line insulators.

The Line Insulators to be of the form and kind known as "Varley's Patent Double Earthenware Insulators," No. 8 size, as used by the Electric Telegraph Company. Each insulator to be fitted with a galvanized iron screw bolt and nut, both made according to pattern supplied to the Contractor. Each bolt is to be tapped with a coarse thread, and the nut to be well fitted after galvanizing; the threads are to be re-tapped for clearing out the zinc, and then dipped in boiling linseed oil, and dried with the oil on before they are fitted to the insulator.

The cups of each insulator are to be tested by immersion in acid water nearly to the brim, the cups being filled also with acid water, and each of these separate fluids connected with the wires from a powerful battery. If, when tested with a delicate galvanometer, the passage of the slightest current of electricity is indicated, the

Specification for Telegraph Materials—continued.

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insulator will be rejected. The outer and inner cups to be fitted together with a compound of resin and sand, and the bolt is to be fixed straight inside the inner cup with the same kind of cement.

The Contractor is to provide a sufficient number of water-tight tanks for testing, and such batteries, battery power, and instruments as may be required; all to be subject to the Engineer's approval.

The insulators, when finished, shall be most carefully packed in very strong iron hooped oak casks, after having first being well bound with straw, and each safely secured as a separate package.

1450 *Galvanized Wire Guards*, to pattern, to be strong and well made, and clean galvanized.

180 *Shackle Terminal Insulators*, each fitted with galvanized iron bolts and straps, the whole made exactly according to the pattern supplied to the Contractor.

480 *Galvanized Iron Stay Rods*, 5 feet × $\frac{9}{16}$ of an inch, made according to the pattern supplied. The stay rods to be made of the best Staffordshire iron, and well galvanized; one end having been formed into an eye, and the other end tapped with a good coarse thread, 2 inches down, and provided with a well-fitted galvanized nut and a galvanized iron washer, 3 inches × 3 inches × $\frac{1}{4}$ of an inch.

1450 yards of *No.* 16 *Copper Wire, of No.* 4 Birmingham wire gauge, and insulated with Wray's compound.

500 *Iron Bolts*, each with an eye. Each bolt to be 12 inches long, 1 inch in diameter, and deep jagged to a depth of 9 inches.

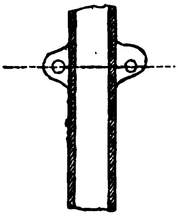
4 *Cwt. of New Lead*, of the best and purest quality.

Iron Poles.—The Contractor is to provide—

1050	15 feet poles	for rock.
125	22 „ „	
630	18 „ „	for ordinary ground.
125	25 „ „	

Specification for Telegraph Materials—continued.

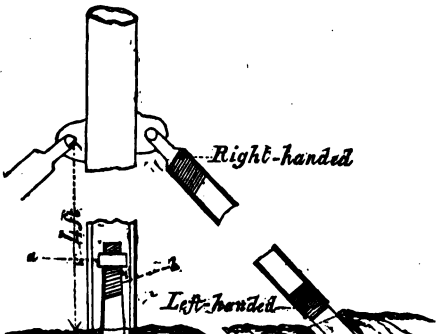
The poles are all to be hollow, cast iron, $\frac{3}{16}$ths of an inch thick throughout, and 1$\frac{3}{16}$ths of an inch inside diameter at top, into which is to closely fit a cast-iron plug tapering to a point at the summit. The 15 and 18 feet poles will be each of 3 inches outside diameter at bottom, but the 22 and 25 feet poles will all be 3$\frac{3}{4}$ inches outside diameter at bottom; a wooden plug 3 inches long is to be driven into each pole at the lower end in ordinary ground.



Each pole is to be provided at 2 feet from the top with an iron collar, with lugs having two eyes exactly opposite each other, and through which stay wires can be fastened; each collar is to be 2 inches deep and $\frac{1}{4}$ inch thick. A sketch is shown in the margin.

Each of the poles for rock is to be provided with the following fittings:—

1. An iron collar that shall fit the pole tightly at 4 feet from the lower end (similar to the above-mentioned collar). Connected with this collar there are to be two plugs of the size required to screw into 1$\frac{1}{2}$ inch gas tubes, screwed with a right-handed screw gaspipe thread, for a depth of 2$\frac{1}{2}$ in.



2. A length of 1$\frac{1}{2}$ inch gas tubing to form the stays (see the sketch in the margin). One half the tubes supplied are to be 10 and the other half 12 feet long; they will not be cut and tapped until the poles are erected.

Specification for Telegraph Materials—continued.

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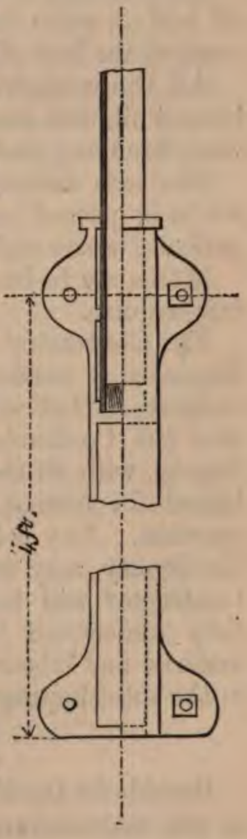
3. Two wrought-iron bolts of the size required to screw into 1½ inch gas tubing to secure the stays to the rock; each bolt is to be 7½ inches long; to be screwed at one end for a length of 2½ inches with a left-handed screw, and to be deeply jagged at the other end for a length of 3 inches.

4. In order to connect the base of the pole securely with the rock, a wrought-iron bolt, 8 inches long, ¾ inch diameter at one end and 1¼ inch diameter at the other end; the smaller end is to be tapped with an ordinary thread for a length of 2 inches, and to have a well-fitted square nut, *a*; the other end to be deeply jagged for a length of 3 inches, and to pass through a cast-iron cylindrical block, *b*, 4 inches diameter, and made to fit tightly inside the foot of the pole.

In ordinary ground each of the poles is, in addition to the collar and wooden plug already described, to be provided with the following fitting:

A cast-iron base, of the form shown in the margin, made in two halves and bolted together with four ¾ inch bolts; the internal rings to fit tight to the tube.

The following tools are to be provided: One dozen tap wrenches; one dozen taps for right-handed screws; one dozen taps for left-handed screws; (these taps to have precisely the same thread as the plugs and bolts); 8 pairs of 1½ inch gas tongs; 4 sets of dies for right-handed screws, and 4 sets of dies for left-handed screws.



Specification for Telegraph Materials—continued.

The castings are to be of good, clean, close-grained metal, sound and entirely free from air holes or defects of any description, and the wrought-iron work is to be of iron equal in every respect to the very best Staffordshire iron.

The Contractor is to submit to the Engineer a sample of each kind of article, and which is to be approved of by the Engineer before the work is any further proceeded with.

The castings are to receive one coat of boiled linseed oil laid on quite hot, and are afterwards to receive two coats of the best oil paint.

All the wrought-iron work is to be dipped into hot linseed oil, and every care is to be taken to protect the work from any rust setting in.

The iron collars, bolts, nuts, and all the small parts are to be packed in strong iron-bound cases, to be made perfectly water tight.

Marks are to be placed on such parts as the Engineer may require.

The Contractor will allow of the entrance of the Engineer, or his deputy, at all reasonable times; and it is understood that without making any extra charge whatever the Contractor will supply the Engineer, or his deputy, with all the necessary machinery, assistance, or labour for testing, and with every convenience for inspection. Any pole or fitting which the Engineer, or his deputy, may find defective, will be rejected, and the Contractor will forthwith replace the same; and it is fully understood that as regards every description of material and labour, the entire contract is to be executed in the most approved and workmanlike manner.

Station Apparatus.

Provide 26 *Double Needle Instruments*, every article used in the manufacture of which is to be of the very best

Specification for Telegraph Materials—continued.

quality; all the details of their construction are to be under the control of the Engineer, to whom a sample of a complete instrument is to be submitted, and his written approval is to be obtained before any others are commenced.

Each coil is to have six ounces of No. 30 silk-covered wire wound thereon, all the steel points of contact to be platinized and all fixed connexions to be soldered, the needles and axles to work perfectly even and true, and to be properly magnetized. The ordinary double-needle code to be painted on the dials.

The axles of handles to be truly turned and the bearings accurately turned to fit; the insulating piece dividing the front from the back of the axle to be of ebonite, $\frac{1}{4}$ inch thick, turned to a sharp edge. A flange is to be fitted to each half of the axle, next the insulating piece, so that the two halves may be firmly brought together, ebonite collars being fitted under the screw heads to insulate the parts from each other. The axles are to be turned when they have been fitted together in the above manner. Slabs of ebonite to be used for insulating the working parts from the wood frame; the connexions to be made with No. 16 gauge copper wire thickly coated with ebonite.

The corresponding parts in all the instruments are to be exact duplicates, so that they may fit in any of the instruments indifferently.

The cases of the instruments are all to be made of the best well-seasoned Moulmein teak, fastened together without glue and only with brass knees, keys, and screws.

Plate glass shall be fitted in a closely fitting door to be made in front of the dial, and there shall also be a door at the back.

Provide 26 boxes *Spare Coils* for the above double-needle instruments; these are to be exact *fac similes* of

Specification for Telegraph Materials—continued.

the dials and coils in the double needle instruments; each set to be of the same depth, and the slides and frames to fit truly the boxes of each instrument; the coils to be wound with six ounces of No. 3 silk-covered copper wire, terminated with spirals of No. 22 gauge; similar wire to be fitted in polished teak boxes with hinges, covers, and locks, and lined inside with green cloth and over the stops.

Provide 6 dozen sets of duplicate *Needles and Axles* corresponding exactly in every respect with those in the double needle instruments and the dials and coils, each axle fitting exactly in each coil; pivots and needles of best steel; pivots turned truly and finely polished, and needles well magnetized and balanced and fastened on axles by a square brass nut screwed against a collar.

Provide 36 *Duplicate Handles* for the double needle instruments, fitting exactly on the axles; the wood part to be highly polished best Moulmein teak; the brass coatings to be perfectly sound and all of one piece; the shaft to pass through the wood handles, and to be fitted at the bottom by a slotted nut sunk flush.

Provide 1 gross best finished *Testing Box Terminals*, with pins 1½ inch long, to be made of hard brass with strong and perfect screws.

Provide 4 dozen *Duplicate Instrument Terminals*, corresponding exactly with those on the double needle instruments. The castings to be perfectly sound, and the screws cut with a strong uniform thread.

Provide 6 gross *Brass Screws* for instrument and battery terminals $\frac{7}{8}$ths of an inch long, gimlet pointed, with well formed heads fitting exactly the countersunk holes of the terminals.

Provide 4 dozen of the usual *Battery Terminals* of the best make, with sound castings and screwed with a strong uniformly-cut thread.

Provide 85 of "*Silver's Improved Batteries*," with each trough filled with ebonite cells, plates, &c.

Specification for Telegraph Materials—continued.

Provide 3 gross duplicate *Spare Copper Cells* for batteries, and 3 dozen *Spare Battery Cells* of the same size and material as those used in the batteries.

Provide 6 gross *Spare Zinc Plate* for batteries.

„ 10 cwt. of best and purest *Sulphate of Copper*, in bright crystals, free from iron and other impurities. All crystals smaller than hazel nuts will be rejected: to be packed in strong water-tight cases.

Provide 2 gallons *Sulphuric Acid.*

„ 1 gallon *Muriated Acid,* both warranted pure and of the highest strength and density.

Provide 2 gallons saturated solution of *Chloride of Lime.*

„ 1 gallon *Wood Naphtha* and ½ gallon *Olive Oil,* both pure and bright.

The last five articles to be supplied and delivered in gallon or ½ gallon earthenware jars, with screw stoppers, all sufficiently protected with dry chalk, or other substance, capable of absorbing the liquor if spilled; the whole to be packed in strong iron-bound cases.

Provide 24 *Magnetizing Keys,* sound and well made, the turnscrews of best tempered steel, and the box-spanners of hard brass, fitting exactly on the nuts to the needles of the instruments. The brass cylinder to be rough milled.

Provide 24 eight-inch *Horse-shoe Magnets* of the purest and hardest steel, strongly magnetized with close fitting keepers; supplied in mahogany cases, and the magnets properly packed in the solid wood.

Provide 1 *Varley's Universal Testing Galvanometer,* with 10,100 and 1000 shunts.

Provide 1 set *Resistance Coils,* 1 to 5000, British Association, properly divided.

Provide 1 *Battery Detector,* wound with large wire.

„ 2 *Line Detectors,* wound with No. 35 wire.

„ 2 lbs. No. 22 *Birmingham Wire Gauge Copper Wire.*

Provide four lbs. No. 30 *Birmingham Wire Gauge Copper Wire.*

Specification for Telegraph Materials—continued.

The wire to be of the highest conducting power, of exactly the specified gauge, and covered with blue or green pure new silk, very close spun over the wire.

Provide 4 lbs. purest *Sheet Gutta Percha,* as used in strips, for binding the joints of the gutta percha covered wire.

Provide 4 lbs. *Chatterton's Compound.*

„ 50 yards *Ebonite Covered Wire,* similar to that used for instrument connexions.

Provide 8 one-gallon *Stoneware Jars,* of completely vitrified best ware, impermeable to acids, best fitting screw stoppers, and rubber joints, and with strong handles. To be surrounded with close basket-work. To be carefully packed with straw in strong cases.

Provide the following *tools,* best Warrington make:—

1 Adze.
2 Axes.
6 Augers, 2 of ⅜ inch, 2 of ½ inch, and 2 of ¾ inch.
3 Battery springs, india-rubber.
2 Ditto brushes, whalebone.
1 Bench vice, 1 hand vice.
10 Billhooks.
8 Brad-awls.
6 Cold chisels.
2 Chisels (plugging).
4 Chisel bars.
2 Draw knives.
2 Sets assorted gimlets.
6 Gouges (wood), ½ in., ¾ in., 1 in.
4 Hammers, large and small.
2 Ditto, 7 lbs. each.
4 Jumpers, for rock, 5 ft. long 1¼ thick.
2 Mallets, 2 oil stones.
20 Lbs. nails, clasps, and brads.
4 Pairs 8 inch pliers }
6 Pairs 5 ditto } square nose with level cutters.

Specification for Telegraph Materials—continued.

2 Fire pots.

2 Paint cans.

4 Paint brushes.

12 Pickaxes, about 7 lb. each, with spare handles.

6 Punners or rammers of iron.

6 Pulley blocks.

2 Planes, Jack, with spare irons.

2 Smoothing planes, with ditto.

2 Lb. resin.

4 Rimers.

20 Fathoms of 2½ inch rope.

3 Screw-drivers, large.

3 Ditto, small.

1 Set of American screw-bits and brace.

1 Gross 2 in. screws.

1 Ditto 1½ ditto.

1 Ditto 1½ ditto.

1 Ditto ¾ ditto.

1 Ditto ⅝ ditto.

1 Ditto ½ ditto.

4 Saws, hand.

2 Ditto, tennon.

3 Spokeshaves, 4½ in. blade.

6 Steel wedges.

2 Shifting spanners.

6 Spades and 6 shovels.

1 Box of jointing tools complete, and containing 2 tinned copper spirit lamps, 1 knife, 1 small furnace, 1 pair of scissors, 1 ten-inch half-round file, 1 pair 8 in. pliers, 1 pair 5 in. ditto, 2 jointing tools. Teak box, painted, with good lock and key, and strong leather straps.

1 Box of tools for instruments complete, and containing 1 four-inch hand vice, 1 bright notched screw plate, and one set of taps, 1 Archimedian drill-stock, 1 magnetizing key, 1 screw-driver, 1 forked ditto, 1 hexagon ditto, 1 Sheffield bastard file, 6 inches, 1 Shef-

Specification for Telegraph Materials—continued.

field smooth ditto, 6 inches, 1 Sheffield superfine ditto, 6 inches, 1 Sheffield bastard round ditto, 6 inches, 1 graver, 1 knife, 1 broad hammer, 1 watch ditto, 1 pair bright cutting nippers, 1 pair cutting pliers, 1 frame-saw, 6 inches; 1 four-inch warding file, 1 three and a half-inch slitting file, 1 broach, 4½ inch, 1 soldering iron, 2 gimlets, 1 brass blow pipe, 1 sash tool brush, 1 fine hair brush, bone back, 6 row; 1 magnet, 3 dozen bridge screws, in tin box; 3 dozen ivory studs, in tin box; ¼ lb. emery powder, best washed, in tin box; ¼ lb. emery powder flour, in tin box; 1 quire emery paper, fine; 1 quire of ditto cloth, 1 lb. assorted brass wire, 1 leather buff, 1 lb. instrument solder (best), 1 stoppered glass bottle, filled with cloride of lime; 2 dozen coil knobs, in tin box.

The instruments and spare parts to be all packed in strong cases, zinc lined, with soldered joints, but no packing whatever is to be allowed until the articles to be packed are approved of by the Engineer or his inspector. The stores and apparatus to be packed in extra strong iron-bound cases or casks, as the Engineer may direct; but they must all be made perfectly water tight, by strips of stout canvas being glued over the joints with marine glue. All the packing and description of packing cases to be under the complete control of the Engineer.

The clauses for testing and inspection may be prepared from the foregoing.

SPECIFICATION FOR WORKS, PLANT, MAINTENANCE, AND WORKING OF A RAILWAY.

General Clauses.

A tender (or separate tenders) are required by —— for the construction and working of the railways authorized by concession (or Act of Parliament).

This specification is prepared as an indication of the general requirements which will be inserted in the contract, but is open to such alterations as may be suggested by the Contractor, and approved of by ——'s Engineer.

Gauges.

Tenders will be received for the lines (or such particular lines as may be specified) on two different gauges, viz., the ordinary gauge of 4 feet 8½ inches, and a narrower gauge, but not less than 3 feet; this will be more particularly applicable to small branch railways.

Conformity with Concession, or ——.

All the tenders are to be in conformity with the concession (or Act of Parliament), copies of which are appended.

Contract to be for a lump sum, and a guarantee without extras.

The contract for the whole of the works (or each line) is to be an absolute guarantee to make, construct, and complete all the necessary works and appliances for a (single) line of railway, with all contingencies of every kind, including (or excepting) the purchase of the land, as hereinafter named, and to provide all required rolling stock, machinery, and equipment, the whole or every portion of which shall be to the complete satisfaction of

Specification for Works, Plant, &c.—continued.

the ——'s Engineer, and to work the line when complete, to the satisfaction of the ——'s general manager. It is to be most distinctly understood that the contract is to be for a stated sum, and that no extras whatever will be admitted under any circumstance whatsoever.

Nature of Contract.

The contract will contain all the usual protective clauses and conditions contained for railway construction,* equipment, and working, but any omission in the contracts or specifications will not be admitted as a ground for the omission of any work which may be necessary to produce a railway complete in every respect, and with every accessory which may be necessary for the safe, efficient, and satisfactory working of the traffic expected or calculated for the line.

Tender to include every Contingency.

The tender is to include all earthwork and rock-cutting, tunnels, if any, viaducts, bridges, culverts, drainage and diversion of streams, retaining walls, road-crossings, diversions and approaches, permanent way, sidings, crossings, switches, traversers, turn-tables, weighbridges, cranes, fencing, gates (or cattle guards, if allowed), telegraph with instruments and stores, stations and station-fittings and furniture, platforms, offices, lodges, workshops, with tools, fittings and stores, and all other buildings, locomotives and fixed engines, rolling stock, machinery signals, gradient posts and distance posts, plant of every description, and all other appliances or stores that are necessary for the safe, economical, and efficient working of the line, or any part of it, and is to include all engineering,

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* See Specifications, general and special, in "Railway Construction and Railways in the East," by W. Davis Haskoll; Atchley and Co., 106, Great Russell Street, Bedford Square.

Specification for Works, Plant, &c.—continued.

management and working expenses, with the provision of competent and efficient officers, engineers, clerks, foremen, artisans, and labourers, engine-drivers, traffic servants, station-masters and lodge-keepers, and all skilled and ordinary workmen.

Control.

The company, or ——, may not necessarily exercise any active control over the management and working of the proposed line of railway when opened for traffic, but in consideration of the sum guaranteed by them to be paid to the contractor, they reserve the right at any time to interfere, if, in their opinion, it be from any cause desirable to do so; and when exercised, their control shall be absolute. They shall in such case have power to require the dismissal of any officer or servant of the contractor for inefficiency, misconduct, or other cause; to annul any engagement, agreement, order, or contract made without their sanction, and which they may consider prejudicial to the interest of the company; to require any traffic or other returns, the alteration of the tariff of fares and freight within certain limits to be agreed upon; they shall at all times have the right and power to inspect and take copies of all letters, books, and accounts, vouchers, papers, and other documents in any way relating to, or connected with, the construction, working, or traffic of the line; letters between the contractor and his law agents will be the only exception to the above condition. The company may also, from time to time, or at any time, demand the production of such reports, returns, and statement of accounts as they may desire; and they shall at all times have absolute control over the raising of any capital and the expenditure of funds, and they may at their discretion disallow any expenditure made without their sanction. The company will have the right to appoint such person or

Specification for Works, Plant, &c.—continued.

persons as they may think proper, to control and superintend the construction, working of the line, and expenditure of the contractor.

Guarantee Fund.

A sum of money hereinafter specified must be deposited with the company by the contractor as a guarantee fund, to be held as security for the full and satisfactory compliance with the terms and conditions of the contract.

These deposits to bear interest at — per cent. per annum to the credit of the contracting party.

When any line, or portion of a line, is certified as completed in a satisfactory manner, and opened throughout, a proportional one-half of the deposit money is to be repaid to the Contractor, any expense which may have been incurred by the company having been first deducted from proportional half of the deposit money before such payment is made. The remaining half shall be held by the company, bearing interest as before, as a permanent guarantee for the efficient maintenance and working of the line and all its appurtenances.

The guarantee fund, already specified, shall be applied by the Company's Engineer, if necessary, towards making good any defect or unsoundness in the works contracted for, or in the materials used in the said works, or any fault or neglect of the Contractor, and in making good any breach in the contract. As a further guarantee for the due performance of the contract, the contractor is to give the company a lien on all plant and materials which shall be placed by him or on his account on the line. And in the event of any breach of contract, or failure on his part to perform the contract according to the term and spirit of this specification, the said plant, or any portion thereof that may be on the line at the time of such breach of contract or

Specification for Works, Plant, &c.—continued.

failure, shall be available for use by the company's Engineer in carrying out and completing the works, or in the maintenance thereof, in the event of the Engineer finding it necessary to take the same out of the hands of the Contractor; and the company may sell such plant or any portion thereof, in order to reimburse themselves for any loss or damage occasioned by such breach of contract or failure.

Purchase of the Line.

The contract will contain provisions empowering the company to purchase the line, plant, stock, stores, and everything appertaining to them, at the expiration of six months after they have, at any time, given notice to the contractor of their intention to do so. The payment shall be made in bonds, returning the same amount of interest, and for the same period of time as shall be stipulated for in the contract; or in any other manner that may be agreed upon between the Contractor and the company; provided that if the working of the line be paying, or have a reasonable prospect of paying within one or two years, a rate of interest on the contract price higher than — per cent., such additional sum shall be paid in like manner, as may be agreed upon by both parties to this contract, or shall be determined by arbitrators appointed in the usual manner, but not in any case exceeding such sum as shall be agreed upon by both the contracting parties previous to the signing of the contract.

Payment for Survey.

The several sums hereinafter specified shall be paid by the contractor to the company, and shall be charged to the capital account for the construction of the line of railway, as the cost of engineering and office expenses incurred by the company in making the survey.

Specification for Works, Plant, &c.—continued.

Binding Orders.

Under no circumstances shall any orders, agreements, or acts of approval or sanction, not in writing, be binding on the company.

Suspension of Traffic.

The company shall have power to suspend the ordinary traffic of this line, if necessary, or by order of the Government, for the conveyance of troops, stores, supplies, or war materials, by payment of a sum proportioned to and calculated upon the average daily or weekly train mileage receipts of the line. The company shall also have power to suspend the ordinary traffic of the line, if at any time the company's resident engineers report any portion of the line, engines, or other stock to be unsafe for the transit of passengers or goods, and for the period during which the traffic may be stopped from this cause, or from any other cause for which the contractor is responsible, the guarantee shall not be payable; the whole interest for that period being deducted from the amount that would otherwise be payable.

Alterations in Plans, Sections, or Designs of Works.

The Contractor will not be finally bound to the line as laid out, or to the works herein specified or already designed; but he may submit to the company's engineer such alterations or deviations as he may desire, provided always that it shall always be in the absolute discretion of the engineer of the company to refuse such alterations or deviations, if he considers they would in any way affect the permanent stability or efficiency of the works; and provided also that any proposed deviation shall not involve inferior conditions as to curves and gradients, or otherwise interfere with the value of the line for traffic purposes. And the company's resident engineer will

Specification for Works, Plant, &c.—continued.

not be finally bound to the line or works, as laid out or specified, but shall have the power of altering the number, size, locality, or description of any work which may have been specified and agreed upon, whenever he shall be of opinion that additions or alterations may be necessary for the safety or efficiency of the works, or for the proper and economical working of the traffic. All necessary drawings, plans, sections, specifications, or other particulars relating to the construction and quality of the works included in the contract, shall be from time to time provided by the contractor and submitted to the company's engineer for his sanction; and no work shall be commenced or be proceeded with until he has signified his approval by signing the drawings, plans, sections, and specification of such work; provided always that such signature and approval shall not release the contractor from his absolute responsibility for the efficiency, stability, and permanency of the works.

The Provision of all Necessaries.

The contractor is to provide all materials, plant, carriage, temporary roads, and other works and things, and labour of every description, and all pegs, stakes, clearing, and labour necessary for setting out the line, and levels, foundations, enclosures, or other works, and shall properly and accurately set out the same, under such control as the company's engineer may desire to exercise, and shall not sell or otherwise dispose of, or remove, except for the purposes of this contract, any material of any kind or description whatever which may be upon the site of the works at the time of delivery or possession of the land, but the same are and shall be deemed the property of the company, if they so desire.

The contractor shall pay all royalties or other patent rights, and also pay all duties and rates which are or

Specification for Works, Plant, &c.—continued.

may become of general application, and also all tolls or road charges, if any, or contribute to the maintenance of roads used by him for the works.

Free Passages.

The contractor will be bound to provide a free passage to England, or elsewhere out of (specify country), as may be agreed upon for such skilled or other labourers or employés as he may find it necessary to import for the purposes of this contract, when he can no longer find suitable employment for them: and he shall only be exempted from this liability with reference to each person imported by the express permission of the company given in writing by the company's engineer or general manager.

Contractors making tenders will state whether they intend to execute the works chiefly with imported or local labour, and if by imported labourers, from what countries.

Regulations for Lodgings and Payment of Wages.

The contractor shall, under penalty of forfeiture of the deposit money, pay all workmen, labourers, and other persons employed by him in and about the works in cash, at periods and in places approved of by the company's engineer, and in manner approved of by him as being in accordance with the usages of the country; and no store, tommy shops, or establishment on the truck system, or in any way assimilating thereto, shall be used or allowed by the contractor; provided, however, that if, and so long as may be required by the company's engineer, the contractor shall establish and maintain, anywhere required, stores for the supply of food and necessaries, which he shall sell to the men at such prices and under such regulations as may be prescribed or approved by the company's resident engineer.

Specification for Works, Plant, &c.—continued.

And the contractor shall be hereby bound to make such arrangements with his workmen and others as shall oblige them and enable them to pay a fair portion of their earnings, if necessary, for the maintenance of their wives and children.

The contractor shall take all requisite precaution to prevent any riotous or unlawful conduct by or amongst the labourers, workmen, and other persons employed on the works.

The contractor shall be bound to discharge any engineer, superintendent, foreman, workman, or other person from his employ if he be required to do so by the company's engineer.

The contractor shall at his own cost provide sufficient and decent lodgings for his workmen, navigators, and labourers of every class at a rent that shall be sanctioned by the company's engineer, in all cases in which such engineer shall consider that the lodging accommodation of the neighbourhood is insufficient.

The company's engineer shall at all times have power to inspect the accommodation provided for the men, and to require the contractor to make such additions or alterations as may seem necessary to the engineer for insuring decency and cleanliness; and if the contractor fail in making such additions or alterations, the company's engineer shall have power to order such alterations and additions to be made by other parties, and the cost arising therefrom shall be deducted from any moneys deposited as security by the contractor.

No work will be allowed to be carried on on Sundays, unless in the opinion of the company's engineer the safety of the works require it.

The contractor shall have an agent upon the line, together with sub-agents, all of whom shall represent the contractor in his absence from the works.

The contractor shall furnish to the company's resident engineer a list of the names of those employed by him as agents or sub-agents in charge of each portion of the works, and any instructions given by the company's engineer, or by his deputy, to such agent or sub-agent shall be considered as given to the contractor.

Repairs of the Line.

The contractor is to keep the whole of the line and the branches, roads, and all appurtenances at all times in good order and repair to the satisfaction of the company's resident engineer, and to provide at his own expense all new materials or stock, and all labour necessary for the complete and perfect maintenance and upholding of the same, and if at any time after the opening of the line, or any length of it, he fail in doing so, the company's engineer shall have power to order and execute any work required entirely at the expense of the contractor, or to dissolve the contract, paying the contractor any amount then actually due, less the cost of putting the line and its appurtenances into proper order; and in case of any dispute as to the amount of cost to be deducted from the amount of contract, the same shall be decided by the company's engineer in England, whose decision shall be final.

Date of Completion of Works.

The whole of the works specified or necessary for the construction and perfect completion of the line, together with all the necessary appliances and working stock, are to be completed on or before a date to be proposed by the parties tendering for the contract and agreed to by the company; and if the contractor fail in completing the work on that date, or if at any time during the progress of the works he discontinue the work for a period of two weeks, or fail in keeping employed such a number of men as shall be satisfactory to the company's resident

Specification for Works, Plant, &c.—continued.

engineer, he shall have power to give the contractor such notice as shall hereafter be defined by the company and contractor, and at the expiration of a given time, determined upon in the contract, the company's engineer shall have the power to take the whole of the works out of the hands of the contractor, and to complete the same at the contractor's expense; and in so doing the company's engineer shall have full power to make use of any of the working plant and material which he may find upon the line and works.

In such case the whole of the guarantee fund then in the hands of the company shall become forfeited by the contractor as a penalty for non-compliance with the conditions of the contract, and the company shall have full power to use and consider the same as their own property, and the contractor shall be further liable for all loss or extra cost which may result from such proceedings and be consequent on the contractor's breach of contract.

Opening Portions of Lines.

The company's engineer may require the completion of successive portions of the line, and may also require the contractor to open such portions of the railway for traffic, and to work the same; and the contractor shall be bound, if so required, to carry on all the work, and the supply of stock, in such a manner as to facilitate the progress of the work, and such successive openings of portions of the line for traffic. (For further clauses on this particular subject, see the specifications in "Railways in the East.")*

Extension of Time for Completion.

No extension of time for the completion of the performance of the contract shall be considered as having

* Atchley & Co., 106, Great Russell Street, Bedford Square.

Specification for Works, Plant, &c.—continued.

been allowed by the company, unless it shall have been permitted and granted in writing, and be for a fixed period, terminating on a given date, mentioned in the document granting such extension of time.

If the contractor should be delayed in commencing any portions of the works, in consequence of the company's resident engineer not being able to give him possession of any part of the land, or from any other cause arising from the acts or omissions of the company, an extension of the time or times for completion shall be made, provided that the company's engineer shall consider that the contractor is justly entitled to the same; and in such case the company's engineer shall determine on the period of such extension, and shall certify the same in writing.

Sub-contract.

This contract shall not in whole, or in any part or way whatsoever, be transferred; nor any portion of the works be sub-let without the permission of, and on conditions approved of by the company's engineer; nor shall any agent of the contractor be paid by him in any way by commission, or by any share of the profits that may arise, unless such agent shall be a partner of the contractor.

Inspection of Works and Plant.

At all times during the construction, and when any portion of the line shall have been opened for public traffic, the contractor shall afford every assistance, and provide every reasonable facility for the company's engineer, his deputies, assistants, or inspectors, or any of the company's officers on duties connected with the railway, over all parts of the line and works; and all yards, workshops, stores, offices, and other places used for the purposes of this contract shall, at all times, be free and open to their inspection.

Specification for Works, Plant, &c.—continued.

Trains Running.

Every day in the week, two passenger trains and one goods train, each way, running at such hours as shall be approved by the company's engineer, will be required on the line. And should the amount of traffic, or prospective advantages, in the opinion of the company's engineer, require it, he shall have power to instruct the contractor to run regularly any additional number of passenger or goods trains.

At the end of three months' running, such extra trains may be discontinued by the contractor, if it can be shown that they do not pay their working expenses. The company's engineer may require the running of such Sunday trains as he may consider necessary, provided always that they shall not exceed in number those running every working-day.

Mails and Troops, &c.

The contractor shall convey the mails and post-office servants, and soldiers, police, and Government stores and supplies, at such times and in such manner, and for such remuneration, as may from time to time be determined on.

Land.

The company will provide all the land required for the line, stations, workshops, yards, roads, approaches, sidings, and for all spoil banks and side cuttings, and all such land shall be freely used by the contractor, without impediment, during the continuance of his contract; but it shall, in all cases, remain the property of the company; but all other land which the contractor may require for carrying on his operations, or for temporary roads, for carrying materials to or from the works, or for other temporary purposes, is to be provided by the contractor at his own expense. In doing this the company will

Specification for Works, Plant, &c.—continued.

render him all the assistance they may be able to confer under the clauses of the concession (or Act of Parliament), but all the expenses incurred in any way must be borne by him, provided always that the land to be used, in any way, shall be such as the company's engineer shall consider necessary and proper, both in position and extent.

Injury to Property.

The contractor will be liable and held responsible for all trespass, damage, loss, or injury of whatever kind that may arise or be sustained by the owners, lessees, or occupiers of land through or in which the various works under this contract may be in progress; and he shall pay the amount claimed as soon as it shall have been certified by the company's engineer, who shall otherwise have power to pay the same out of the contractor's deposit money.

Character of the Works, &c.

The whole of the works and materials are to be of such description and quality, and the work in all its details is to be executed in such manner as shall be satisfactory to the company's engineer.

Any omission in the specification or drawings will not be admitted as the ground for the omission of any work, or any accessory to the work, which in the opinion of the company's engineer may be necessary to make each part of the work complete and secure, including such provisions as may be necessary to protect the work fully from the effect of floods, rain, and wind.

Any information or particulars, or any list of quantities that may be provided to the parties tendering, will not be guaranteed as correct.

If the information should prove incorrect, or if the lists provided should be insufficient or defective, the full

Specification for Works, Plant, &c.—continued.

quantities and all things required for the proper completion of the work must be made good by the contractor, without any further or extra charge.

The company's engineer is to have full control over the material, order, and manner in which the work is to be carried on.

Supplies from England.

The rolling stock, permanent way materials, tools, iron work, office fittings and furniture, telegraph, and telegraph materials and stores, which will have to be executed in and supplied from England, shall be under the complete control and direction in every respect, and to the entire satisfaction of the company's engineer in England, as regards design, manufacture, workmanship, material, inspection, and casting, and packing for sending abroad.

Clearing the Ground.

All vegetable matter and stumps or roots shall be cleared away or grubbed up to the full width of formation and side slopes, unless where any special written instructions are given by the company's engineer.

Formation.

The cuttings and embankments are to be made generally as shown in the plans and sections, subject however to the modifications contemplated in this specification, or to any special and particular instructions given by the company's engineer; the formation widths for embankments on good strong ground will be about 15 feet for single line, and in cuttings including side drains, except in rock cutting, about 22 feet; occasionally this may be reduced to 20 feet, and in rock cutting to 18 feet. Loose or very light sandy soil, or some schistous materials, may require formations of 18 feet wide.

Specification for Works, Plant, &c.—continued.

Slopes.

It is expected that the slopes generally will stand at 1½ to 1, but flatter slopes will have to be given where required by the company's engineer. The slopes for the rock cuttings, and embankments made therefrom or from boulders, must be of such dimensions as the company's engineer shall in his opinion consider safe and sufficient. The above dimensions apply to the 4 feet 8½ inches gauge.

Side-lying Ground.

For embankments laying across sidelong ground, steps or benches shall be cut so as to obtain a secure base for the embankment to rest upon without risk of slipping.

Drainage.

All the necessary drainage is to be provided, whether as side drains, catchwater drains, culverts, cross drains, or otherwise. The waterway in all these, as well as in river and stream bridges, shall be such as the company's engineer shall consider sufficient.

If, during the process of the works, it should appear evident to him, from the nature of the ground, that any culverts or drains have been omitted from the plans, sections, or specifications, such culverts and drains shall still be provided and completed, of such dimensions as the company's engineer may require, and as if such had been fully specified or particularized on drawings and sections.

Where drains are cut in soft ground, or where the inclination is steep, such drains shall be paved, or pitched and lined with rubble stone, or such other measure shall be adopted as shall fully prevent all risk of injurious scour.

Slopes of Earthworks.

The slopes of the earthworks shall be such as, in the

Specification for Works, Plant, &c.—continued.

opinion of the company's engineer, may be necessary for the safety of the work.

To prevent injury to the works from floods, rains, or wash of drainage, all necessary provisions and precautions will have to be adopted, whatever they may be.

Wherever, from too close proximity to a road or stream, or other cause, the full proper slope of an embankment, satisfactory to the company's engineer, cannot be obtained, a retaining wall shall be built, of such material, height, thickness, and batten, as he shall require.

Road and Stream Diversions.

All roads and streams, of whatever dimensions, which in the opinion of the company's engineer require to be diverted, shall be diverted accordingly, and all the works connected therewith shall be conducted to the satisfaction of the company's engineer, either as regards width, depth, slopes, inclination, or as to any materials or works which he may consider desirable.

Level Crossings and Road Bridges.

At the crossing of all roads where level crossings will be allowed, whether a rise or fall is required to be given to the approach road on one or both sides, the proportion of such rise or fall shall not exceed 1 in 20, and the width of the approaches, the slopes, fencing, metalling, drainage, all carrying out of the works shall in every respect be satisfactory to the engineer.

Over-bridges will have to be built wherever the company's engineer may require this to be done; and they shall in all respects be constructed of such dimensions, materials, and workmanship as he may require; and the contractor will be bound to build them at such time, and on such sites, and in such manner, and with such conveniences as the company's engineer shall determine and require.

Specification for Works, Plant, &c.—continued.

Bridges and Culverts.

All foundation pits are to be excavated of such depths and dimensions as the company's engineer shall require, and with all shoring and pumping he may order, and will have to be filled with concrete to such extent as he may require. Piling, planking, stone landings, or coffer-dams will have to be used wherever he may consider them necessary.

The bridges and culverts are to be of such materials, description, dimensions, and angle of crossing as the company's engineer shall particularly specify and approve. A particular specification and drawing of every bridge and culvert, with the kind and quality of all materials proposed to be used, shall be submitted to and approved by the company's engineer before any of the work is commenced or proceeded with.

The bridges are to be all for a single line of railway, unless where any special circumstances should necessitate them in the opinion of the company's engineer to be otherwise.

The piers of river bridges shall be built of the best solid and well bonded ashlar masonry where required, and with sufficient through stones, and with cut-waters up to flood level. The abutments will be faced with ashlar, or best block in course, backed with large coursed rubble well bonded into the face-work; where brickwork may be allowed by the company's engineer for the purposes, only the best hard thoroughly well burnt bricks will be admitted, with as much herringbone work as may be required, and all laid in such cement as the company's engineer may order.

All arches, girders, and superstructures must be built of such materials, forms, and dimensions, and in such manner as the company's engineer shall approve.

The wing-walls may, if allowed by the company's

Specification for Works, Plant, &c.—continued.

engineer, be built of dry rubble; but the masonry of the abutments must be well bonded into the wings, whether built dry or laid in mortar.

Culverts to be built of rubble masonry or brickwork, or of a combination of both, as hereafter to be specified. They may in some cases, if allowed by the company's engineer, be built of dry rubble, provided the stones are sufficiently large: but the arches must all be turned in brick or dressed stone, laid in hydraulic mortar or cement, if required by the company's engineer. These and dry stone retaining walls must at least be equal in quality to the best constructions of the kind built in the country.

Permanent or temporary diversions of streams, where at any time required, are to be made by the contractor; and where in such diversions any piling or cofferdams are required, the piles are not to be drawn after completion of the work, but they are to be cut off level with the bed of the stream.

All arches are to be built on strong and properly-formed centering, approved by the company's engineer, of hard, well-burnt and well-shaped bricks, of uniform size and thoroughly bonded; or of ashlar or block in course truly radiated, in hydraulic mortar or cement, and in every way in such manner as shall be approved by the company's engineer.

All arches, after completion, will have to be thoroughly well swept and asphalted $\frac{3}{4}$ of an inch thick. No centering to be removed without the express permission of the company's engineer.

All arches to be laid with neat close joints.

Where ordered, the bed of any stream is to be paved or pitched with blocks of stone, to form an apron or invert to prevent floods from scouring the bed, and all culverts will have to be provided with catch-water basins

Specification for Works, Plant, &c.—continued.

well built in hydraulic mortar, or in such cement as the company's engineer may require.

All foundation pits are to be excavated of such dimensions and to such depths as the reaching of a firm and solid bottom, when the company's engineer considers that this should be done, and any quantities of good concrete he may require shall be thrown into the pits to such depths as he may wish.

The concrete is to consist of one part of lime, not slaked or fallen, and quite fresh, two parts of clean sand, and four parts of broken stone or clean gravel, the whole well mixed together and wetted only when required for immediate use; the concrete must be made in a thoroughly clean manner, and wheeled in barrows or carried to the pit in baskets; as much as possible it shall be tipped into the pit with a fall of about six feet; punning the concrete will only be had recourse to under special instruction; after being thrown into the pit, it shall, if ordered by the company's engineer, be grouted with a good thick grout of the consistence of cream; the grout is to consist of quick lime with a little sand and water, and is to be poured on quite hot.

When ordered by the company's engineer in foundation pits below any water level, or which he may consider in any way exposed to wet, the mortar shall be made with such cement, and in every other respect in such manner, as he may think advisable.

Where the ground is loose and soft to any depth, piles may have to be driven until they reach a solid bed or drive hard; these piles must average not less than 7 inches diameter, and driven at distance of about 9 inches apart in the clear, and completely over the bed of the foundation pit; after being well driven, and cut off at a uniform level, stones large and small must be well rammed in between the piles, until the surface is quite hard and level; this must be allowed to remain for a

Specification for Works, Plant, &c.—continued.

short time; and as soon as ordered by the company's engineer, a bed one foot thick of concrete is to be laid over the whole, and then large foundation stones or large stone landings are to be laid down over the whole bed.

As a general rule for ordinary work, and when approved by the company's engineer, foundations and walls are to be built of good coursed rubble masonry or brickwork, the whole being well bonded together, and in good hydraulic mortar; but cement of approved quality must be used instead of lime whenever ordered. All wing walls and parapet walls must have well bonded newels or pilasters; all corners of rubble walls must be roughly hammer-dressed square. Where allowed by the engineer, rubble wing walls, retaining walls, or others, must be finished at top either with large, rough, flat-bedded and hammer-dressed stones, with square joints, laid in mortar or cement, as may be ordered; or with stones set on edge, laid in mortar or cement, and wedged up tightly together, so as to give a firm coping to the top of the wall; in either case the coping stones must project at least 2 inches clear of the face of the wall, so as to give a good drip.

Wherever, however, the company's engineer shall order it, properly dressed coping stones, of dimensions approved, shall be used for wing walls, parapets, or wherever required.

Masonry Materials, Mortar, &c.

The bricks made use of shall in all cases be hard, sound, well-shaped, thoroughly burnt, and of uniform size; the best coloured shall be picked out for face work; all bricks must be well soaked in water before being used.

The mortar must be made from hydraulic lime, fresh burnt, and with clean sharp sand. The lime must be mixed dry with the sand, in the proportion of three parts

Specification for Works, Plant, &c.—continued.

of sand to one of lime. They must be well ground together in a proper mortar mill erected for the purpose, with a proper quantity of water. No greater quantity of mortar must be made at a time than can be used in twenty-four hours. No mortar which has previously set, or become hard, will be allowed in any part of the work.

The brickwork will be laid in such bond as the company's engineer will particularly specify. Pieces of bricks, except as closes, will be carefully excluded from the work.

All stone used must be of approved quality, sound, hard, free from shakes or flaws of any description. The stones must be well dressed, carefully laid, and well bonded together, according to the character of the masonry—as ashlar, block-in-course, or rubble. The corners of walls built of rubble masonry are to be carefully squared and plumbed, and as many quoin stones and through stones or hearting stones are to be used as the company's engineer shall order. In all cases the stones are to be laid on their natural beds, and are not to be placed on edge, or with the broad face outwards merely for the purpose of making a face on the front. Strength and durability are the conditions to be aimed at. As much as possible the longest stones are to be used as headers, to bond through or deeply into the thickness of the walls.

(For more extensive specifications of masonry, &c., see "Railways in the East," by W. Davis Haskoll.)*

Timber Bridges.

When timber bridges are allowed, all piles, capsills, longitudinals, and other timbers required are to be of teak, ironwood, stinkwood, or other approved wood of the country, sound, without flaws, shakes, large or dead

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* **Atchley and Co., 106, Great Russell-street, Bedford-square.**

Specification for Works, Plant, &c.—continued.

knots, and well squared. The workmanship shall be the best of the kind known as ship carpentry, with all joint surfaces wrought perfectly true. All the joints, mortices, tenons, and points of contact between timber and timber, or timber and iron, to be well payed with stiff white lead immediately before they are put together, or with tar, pitch, grease, and quicklime melted together. All iron straps, clamps, bolts, and other fastenings are to be of the best material and workmanship, and to be fixed where required.

The longitudinal timbers across any span are all to be in one piece; splices will only be allowed over cap-sills and piers.

On account of the difficulty in obtaining long straight timber of sufficient good quality and scantling, it is advisable that no span of any of the timber bridges should exceed 30 feet from centre to centre of piers.

Open culverts, where allowed, not exceeding 12 feet in span, may have longitudinals without underbracing laid on capsills or wall pieces, provided they be of such length and scantling as the company's engineer shall approve, and properly tied together.

Iron Bridges.

The minimum width in the clear will be 14 feet for the 4 feet 8½ inch gauge.

The wrought-iron bridges may be of either of the descriptions known as Warren's, lattice, compound, or plate-girders. The material must be specially approved before the girders are made, and the company's engineer in England must have every facility afforded to himself or his deputy or inspectors for examining and testing; and the contractor shall at his own expense supply all conveniences, machinery, and labour for so testing any girder, or plate, bolt, rivet, bar, or other iron.

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The girders will be tested by loading them, and in any other way the company's engineer may think fit, and they must stand such tests to his perfect satisfaction.

Each girder is to be so designed that the strains from the rolling load, in addition to that from the weight of the bridge itself, including platform and permanent way, shall not exceed 4 tons per square inch in section, or 3 tons per square inch in compression, at any point on the girder.

It is advisable as regards plate girders that they should not be rivetted together in large pieces, on account of the difficulty of transport by waggon, and no piece should in any case exceed two tons in weight, but the iron should be so arranged that as few rivets as possible should have to be put in when the girder is to be finally fixed in its place. (See Plates.)

The girders must be so designed that, after being tested and found satisfactory, certain rivets may be cut out and the girders separated for the purpose of shipment and transport. A sufficient number of spare rivets are to be supplied to rivet up the work when at its final destination.

All bolts, nuts, washers, and span rivets are to be carefully made from the best materials; all threads are to be Whitworth's, and the bolts are to be screwed for their full proper lengths.

The whole of the work is to be marked with such marks and in such a manner as the company's engineer in England shall direct, and each piece is to have such a distinguishing mark that there shall be no difficulty in putting the work together when delivered at its destination.

All the wrought iron for plates, bars, bolts, rivets, &c., is to be equal in quality to the very best Staffordshire. The workmanship and finish throughout is to be of first-class description.

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All the joints of the plates, bars, or angle irons are to be planed. The outside edges of all plates are to be made perfectly smooth and regular by planing or otherwise; all cover-plates are to be sheared perfect by square, and are also to be made smooth and regular at the edges by planing or otherwise. The rivet-heads underneath the bed-plates are to be countersunk.

Great attention is to be paid to protect all the ironwork before any oxidation takes place. All bolts, nuts, washers, spare rivets, &c., are to be heated and dipped into hot boiled linseed oil.

The whole of the larger pieces of ironwork is to receive one coat of boiled linseed oil laid on hot, and is afterwards to be painted with two coats of best oil paint, the first coat red lead, and the second some darker colour, approved by the company's engineer.

The ends of all the girders, and all pieces of girders, are to be thoroughly well protected for transport by bolting on pieces of wood, or in some other approved manner.

The bolts, nuts, and all small pieces of iron are to be packed for a sea voyage in extra strong air-tight and iron-bound cases, and in a manner approved by the company's engineer.

The entire of the ironwork is to be executed in the most approved and workmanlike manner, according to the direction and complete satisfaction of the company's engineer, who shall have full power to inspect and control the entire manufacture, to test the whole of the work, and be at perfect liberty to reject any portion of the material which he may consider unsatisfactory, or any part of the manufactured work of which he may disapprove; and the contractor shall be bound to accept his opinion as final.

Specification for Works, Plant, &c.—continued.

Permanent Way.

Ballast, sleepers, rails, fastenings, switches, crossings, plate-laying, &c.

The ballast may be either broken stone or other material approved of by the company's engineer; if gravel, it must be clean; and if of broken stone, it shall be broken into pieces such as to pass readily through an iron ring of 2½ inches in diameter.

The ballast shall be laid along the whole length of the line and sidings, on the formation surface, and must be in the proportion of 1½ cubic yards to every lineal yard of single line.

The rails, sleepers, and fastenings must be on a system thoroughly approved of by the company's engineer; the weight of rail is not to be less than 50lbs. to the lineal yard; length of rail generally 21 feet, with a small proportion allowed of 18 and 15 feet lengths under proper restrictions. The contractor will submit drawings, specification in detail of the permanent way he proposes, with samples of every portion of it.

The quality of the finished rails as regards toughness, hardness and strength, shall be such as to be perfectly satisfactory to the company's engineer, who shall have power to test any of the permanent way materials in any manner he may think fit, and at the expense of the contractor.

Each rail is to be stamped on the side distinctly with the maker's name, the month and year of manufacture, and with the initials of the railway company.

It is not intended to exercise any supervision over the manufacture of the rails or any other part of the permanent way materials, but the contractor should require the makers to enter into a guarantee to renew free of charge any rails certified by the company's engineer to have failed from defective quality or manufacture, at any

Specification for Works, Plant, &c.—continued.

time, not exceeding two years from the time when the portions of the railway on which they are laid shall have been opened for public traffic.

Sidings, with switches, points, crossings, &c., must be laid where directed by the company's engineer; the above specification, as far as it relates to the permanent way, will of course apply to all sidings, with switches, points, and crossings, &c., in all applicable matters, and the contractor is to provide not only the best materials for the permanent way and the best manufacture, but also to submit all approved improvements.

No rails will be received varying more than ¾ lb. from the weight determined on, and no variation from the length determined on exceeding one-eighth of an inch will be allowed.

The proportion of sidings is not expected to amount to 10 per cent. of the whole length of the line.

Wrought iron distance gauges, approved, tested, and stamped by the company's engineer must be provided by the contractor. They are to be so constructed that they will lie only square across the line; to these gauges the rails will be laid.

No rail is to be bent or straightened by hammering, but by a screw-press to be provided by the contractor. In sharp curves, and when directed by the engineer, the rails will have to be bent, before laying, to the correct radius of the curve given by the company's engineer.

The rails, fastenings, and sleepers being all adjusted, each sleeper is to be well and soundly underpacked with proper and suitable ballast, and covered in. The spaces between the sleepers, both inside and outside the rails, are to be well filled in and neatly trimmed off to a slope of 2 to 1, and in such manner and form for drainage as shall be approved by the company's engineer.

The contractor will be allowed to use the permanent rails for carrying on the works when the road is properly

Specification for Works, Plant, &c.—continued.

formed, but subject entirely to such regulations and limitations as shall be laid down at any time by the company's engineer, and should any of these be broken through, this permission will be withdrawn; any rails injured from any cause during the progress of the works will not be allowed to form part of the permanent way.

The contractor will be allowed to draw ballast along the permanent way when properly laid and packed, but care must be taken to keep the sleepers well covered with ballast, and any sleepers injured in any way must be replaced by new ones before the line is opened for traffic.

All subsidence or irregularities that may occur in the line or proper level of the rails, from whatever cause arising, must be accurately rectified by adjusting, lifting, or underpacking, before such portion of the permanent way can be certified by the company's engineer.

In any case when the permanent way may be laid on longitudinal baulks or other woodwork, as in the case of any bridges, open culverts, or otherwise, special provision will have to be made for the security of the rail and fittings.

Fencing.

The fencing is to be of strained iron wire fence, with five lines of galvanized iron, cable strands, No. 0.

The dimensions, description, weight, and quality of fencing to be supplied, fixed, and strained complete, must be fully specified, with the number and description of uprights and straining posts which are to be supplied to each mile of fencing, as also a description of the wrought iron gates. All the materials and workmanship must be good quality.

Electric Telegraph.

See the special specification given on this subject.

Specification for Works, Plant, &c.—continued.

Stations, Goods-sheds, Workshops, Running-sheds, Tank-houses, and other Buildings.[*]

These buildings will be placed wherever the Company's engineer may require, and they will have to be in complete accordance with special plans and specifications approved and signed by such engineer. They must be of such extent and with all such appliances and accommodations as he may consider sufficient to effectually carry out all the requirements of the traffic expected on the railway. Any additions he may require to any stations, yards, sidings, workshops, sheds, or other buildings, or their fittings and appliances during the working of the line, will have to be provided by the contractor without any extra cost.

Subject to such portions of this specification which may apply to any buildings, they will have to be constructed also with due regard to the following clauses:—

No external plastering will be allowed, but the outer faces of all walls exposed to weather, whether of brick or rubble masonry, shall be pointed as the work proceeds, and whilst the lime-mortar is moist, with mortar containing such proportion of Roman cement as the company's engineer may direct. All the joints are to be well picked out and neatly trimmed up with the trowel, so as not to project and hold moisture. The joints of the brickwork may be drawn after being trimmed out with the point of the trowel, and such joints are not to exceed 5-16ths of an inch thick. All ventilating bricks shall be inserted where required.

All arches are to be turned with a regular and proper curve with bricks selected for the purpose, and are to be laid in the most careful manner with proper bond and with neat, close joints. The centerings of gateways and other large arches are not to be removed until ordered by the company's engineer.

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[*] For numerous designs and working drawings of railway stations and other buildings, see "Railway Construction," and "Railways in the East," by W. Davis Haskoll, and the works of Mr. G. D. Dempsey; Atchley and Co., 106, Great Russell-street, Bedford-square.

Floors in the workshops are to be paved; in engine and boiler houses, in running sheds and carriage shops, brick on edge in mortar, or as may be directed.

Provision must be made for a sufficient quantity of wood paving, six inches deep, in machine shops, &c.

Beams and wall-plates, girders, joists, brest-summers, struts, ties, braces, rafters, &c., for goods-sheds, workshops, &c., will have to be executed in the best style of rough carpentry, with sawn faces in all the main scantlings, but wrought perfectly true at all surfaces of contact; all mortices, tenons, bird's mouths, scarfs and all joints to be well and truly formed and fitted. All joints in any way exposed to wet are to be payed with white lead, which is to be applied immediately before the work is finally put together.

Where the ends of beams, girders, or purlines project beyond the walls to form cantilevers, such projections are to be dressed to forms ordered by the company's engineer.

All the timber of whatever kind is to be of the best quality and of the most approved kind of the country ordered by the engineer, and when he may think it applicable, and all the timber, of whatever kind, shall be sound and free from all defects.

Boarding may be of native wood, or of American or Baltic red or white pine, as may be proposed or agreed upon; generally it is to be gauged, and grooved and tongued, or matched; 1¼ inch thick for floors, and 1 inch thick for ceilings and partitions.

The window frames of engine shop and carriage workshops, &c., are to be of cast iron.

The roof-covering, whether of slates, pantile, Italian tile, of iron or zinc tiles, or of corrugated iron, is to be

Specification for Works, Plant, &c.—continued.

well and carefully laid so as to be absolutely free from leakage at all times, and secured with proper composition nails where necessary; the courses and overlap to be such as ordered. Iron gutters, ridges and valleys, as ordered, to be carefully laid, and secured with long wood screws from leakage and wind, are to be provided to all roofs when desired, with down pipes at intervals along the whole length of the eaves; all to be of the sizes and thicknesses that may be ordered. The down pipes are to be well secured to the walls with strong holdfasts, and brought down within six inches of the ground, and are to discharge into a brick drain leading round the whole building, and discharging at such points not more than 50 yards distant, as directed by the company's engineer. The surface of the ground between the side of the drain and the wall, not less than 2 feet broad, to be paved with brick, with a steep fall from the wall.

The main doors of engine and carriage workshops, and other buildings where it may be required, are to be fitted to run with iron rollers on iron rails laid for the purpose. All other doors and gates to be hung with wrought iron hinges or cast iron butts, as may be required.

When allowed by the company's engineer, the framework of roofs may be left open. All doors and windows of wood, and all joiners' work of every description, are to be of the best material and class of workmanship under each head. All ironwork is to be of the best quality—equal to the very best Staffordshire—and of proper and suitable weights and dimensions; it is to be protected from any oxidation commencing to set in upon it, by being dipped, whilst hot, into hot boiled linseed oil.

All fireplaces, chimney-pieces, window and door fastenings, kitchen and other sinks, urinals, water cisterns and piping, water closets, and all other proper fittings, are to be of such description and quality, and fitted and secured

Specification for Works, Plant, &c.—continued.

in such manner, as shall be to the complete satisfaction of the company's engineer. All cesspools, sewers, drains, traps, that may be necessary for the discharge, under healthy conditions, from sinks, urinals, or water-closets, are to be provided of such dimensions, material, and workmanship as shall be thoroughly and completely effectual for the purpose, and to the satisfaction of the company's engineer.

The ceilings of the main stations and offices are to be plastered in the best manner, with plaster of the best description, on laths and ceiling joists; and the walls, internally, are also to be plastered in the best manner and with the best material.

The skirtings on the ground-floor will have, in part, to be done with cement, not less than 4 inches in height.

The contract is to be an absolute guarantee to complete every building with all necessary accessories and every requisite to make it complete, well finished, and completely fitted, so that no further work may be necessary to make it in any way suitable to its required purpose, and so that it shall be to the complete satisfaction of the company's engineer.

Engines, Boilers, Machinery, Tools, Shafting, &c.

The engines for the workshops shall be high pressure, capable of working to a high degree of expansion when but a small power is required. They must be well finished, well supplied with all appliances and requisites, and all of the very best materials.

No particular class of engine is specified, but for 12 and 15 horse power engines; preference will be given, other things being equal, to a double engine, with small cylinders and long stroke, the fly-wheel in centre, the rim so constructed as to take a driving band, 9 inches in width, and so arranged that either or both cylinders may be used together or separately.

Specification for Works, Plant, &c.—continued.

Two boilers will be required for each engine, and may be either "flue" or "tubular," but in any case they must be of very superior material and make, capable of giving ample steam, with a working pressure of 60 lbs. to the inch, with the smallest possible consumption of fuel, and be supplied and fitted with all the usual pipes, valves, &c., for working together or separately, with sufficient and proper pipes to connect them with the engines, and with all the fittings necessary and usual, such as steam valves, safety valves, blow-off cocks, scum cocks, water gauge, steam pressure gauge, water and steam gauge cocks, mud plugs, &c. &c., usually supplied with first-class engines and boilers. The boilers will have to be tested to 150 lbs. to the square inch.

The shafting is to be of the "Best best" iron, free from all flaws and defects; to be turned up perfectly true, and parallel to 3¼ inches diameter, except for a distance of 5 feet on one length, which is to be finished to 4 inches diameter, tapered to 3¼ inches, and finished off bright.

The coupling boxes to be in two halves, one half on each end of shaft, and securely keyed, and to bolt to each other with four ¾ inch bolts. The plummer blocks of best cast iron, with best gun-metal bushes, and provided with syphon cups, or other approved method of lubrication. Provide all driving drums, speed pulleys, &c.

All machinery, tools, and shafting must be manufactured and supplied by first-class makers only.

List of Machinery for a first-class Workshop.

1 Fifteen horse-power engine and two boilers, shafting, plummer blocks, &c.
1 Wheel-lathe, take in 5 feet 6 inches wheels.
1 Crane for ditto.
1 Self-acting slide and screw-cutting lathe, 12 inch head stocks, gap, checks, &c.

Specification for Works, Plant, &c.—continued.

1 Self-acting slide and screw-cutting lathe, 18-inch head stocks; no gap.
1 Hand lathe, 8-inch.
1 Wood lathe (foot treadle).
1 Shaping machine for all work (full size).
1 ditto ditto (small).
1 Planing machine, plane 8 feet.
1 ditto plane 2 feet 6 inches.
1 Punching and shearing machine, 1 inch x 1.
1 Drilling and boring machine, self-acting, vertical.
1 ditto ditto, vertical (small plain).
1 Screwing machine, ½ inch to 2-inch.
1 Fan (Scheele's) 5 fires and cupola.
1 Steam hammer, 5 cwt.
1 Circular saw-bench and saws.
1 Hydraulic press (for wheels).
All necessary driving drums.

Add fitters' and smiths' tools, crabs and portable forges, vices, benches, jacks, screwing tackle, hoisting tackle, blocks, pulleys and ropes, chains, ladders, traversing jacks, grindstones and C. J. frames, wheel furnaces, cranes, lorries, shop-barrows, &c. &c.

Machinery for small Workshops.

1 Eight-horse power engine and 2 boilers.
1 Wheel lathe, to take 4 feet 6 inches.
1 Self-acting slide and screw-cutting lathe, 12-inch head-stocks, gap, chucks, &c.
1 Self-acting slide lathe, 8-inch stocks, &c.
1 Wood lathe (treadle foot).
1 Planing machine.
1 Shaping machine.
1 Punching machine.
1 Drilling machine.
1 Ditto ditto (small).
1 Screwing machine (full size).

Specification for Works, Plant, &c.—continued.

1 Fan (Scheele's).
1 Hydraulic wheel press.
Shafting and plummer blocks, &c.
1 Circular saw, bench, and saws.
All necessary driving drums.

Water Supply, Ash-pits, Weigh-bridges, Switches, Points, Crossings, &c.

Tank-houses, with cast-iron tanks, are to be erected at an average distance of 20 miles apart, and also at the workshops. When rivers offer a supply of good water, and are not liable to be dried up in summer, a tank, tank-house, pumps worked by steam engine, and supply pipes shall be erected, and with all necessary provision for distribution, as pipes, valves, stop-cocks, cock-posts, water-cranes, waste-pipes, &c. &c. In other places it will be necessary to sink trial pits and wells, or bore artesian wells, to obtain an efficient supply of good water for locomotives, and then to establish the necessary pumps, tanks, engines, pipes, cranes, &c. &c.

Ash-pits, for cleaning out the ash-pans and fire bars of locomotives, shall be erected in places approved by the company's engineer, say, at each watering station. Each outside pit to be, say, 50 feet long, 4 feet broad, and 3 feet deep, of brick, with steps at each end down into the pit. A paved gutter or pipe for drainage to be provided where required; floor to be paved with brick on edge in cement; walls 1 foot 6 inches thick; longitudinals 14 inches square to carry the rails, laid at the proper level, firmly bolted down, and projecting 4 feet beyond the pit at each end; timber to be of the best native kind of wood.

A ten feet long 12-ton weighbridge, of best description, to be erected at the entrance of each goods shed.

Each station to be provided with a siding of length

Specification for Works, Plant, &c.—continued.

directed by the company's engineer, with switches, points, crossing. (See Special Specification.)

A 36-feet turntable is to be provided at each terminal station, and at the workshops, and a Dunn's patent traverser, 20 feet long, at the main terminus.

Two timber warehouse cranes, each to lift 2 tons, are to be provided in each goods station; all necessary cranes for workshop's, and one 10 ton travelling crane.

Rolling Stock.

The following may serve as an indication for rolling stock:—

8 locomotives and tenders.
9 first and second class composite carriages.
4 second and third class ditto, ditto.
6 horse boxes.
3 carriage trucks.
5 break vans.

For further precedents of railway specifications see "Railway Construction." For many valuable suggestions for specifications of engineering works generally, the reader is invited to consult the "Handbook of Specifications, preceded by a Preliminary Essay on Forms of Specifications and Contracts," by Professor T. Leverton Donaldson, the pages of which contain specifications by some of the most eminent engineers of the day.

PART II.

AN

ALPHABETICAL PRICED LIST

OF

MACHINERY, PLANT, TOOLS, AND FITTINGS

REQUIRED BY THE CONTRACTOR

IN THE

EXECUTION OF PUBLIC WORKS.

ALPHABETICAL LIST

OF

CONTRACTOR'S MACHINERY, PLANT, TOOLS, AND FITTINGS.

PRELIMINARY REMARKS.

DURING four years' experience on Engineering Works in the East, we had many occasions to feel with regard to ourselves, and to observe amongst the Contractor's Agents, the great want of a PRICE BOOK relating to machinery, plant, tools, fittings of workshops, &c. On many works these matters become features of great importance, and the want of some information on the subject causes inconvenient delays and often much dangerous uncertainty as to estimates and tenders; this has induced the Author to undertake the following compilation, by means of which he hopes to remove one of the difficulties so often besetting the tendering and contracting for Public Works, and at the same time one of those shoals on which so many hopes have been wrecked.

The proportion of discount will have to be considered particularly in all matters relating to machinery, plant, tools, &c.; generally the discount will be the more liberal on all things which may be expected to be found largely in stock, and *vice versâ*. Fair prices for good work and materials is a safe and sound principle in all Engineering work.

CONTRACTOR'S PLANT AND TOOLS.

Adzes, per dozen.

	1.	2.	3.	4.
	s.	*s.*	*s.*	*s.*
Carpenter's adze	28	30	32	35
Ditto Scotch blued	39	43	47	51
Ship carpenter's ditto	32	36	39	42
Wheeler's ditto	32	36	39	42
Spout ditto	23	25	27	29
Carpenter's round eyed ditto	43	47	51	55
Fencing ditto	37	41	44	47

Anvils.

Per cwt.	35*s.*
Ditto, stake, per cwt.	55*s.*

Augers, per dozen.

		Inches.			
		3/8	1/2	5/8	3/4
		s. d.	*s. d.*	*s. d.*	*s. d.*
No. 1.	Carpenter's shell augers	7 0	7 6	8 9	10 6
„ 2.	Ship carpenter's do.	8 3	8 9	10 0	12 0
„ 3.	Carpenter's eyed do.	10 6	11 0	12 6	14 6
„ 4.	Black screw do.	10 9	11 0	13 0	15 0
„ 5.	Bright screw do.	13 6	14 0	16 0	18 0
„ 6.	Bright Scotch screw-eyed augers	20 0	21 0	24 0	27 0
„ 7.	Best bright brace screw bits	17 0	18 0	21 0	23 0
„ 8.	Wheeler's London bruzzes	32 0	34 0	38 0	40 0

AUGERS, per dozen—*continued.*

Inches.

	⅞		1		1⅛		1¼		1⅜		1½		1¾		2	
	s.	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*
No. 1...	12	3	14	0	15	9	17	6	19	3	22	0	28	6	34	0
„ 2...	13	0	15	9	17	6	19	6	21	3	23	3	28	9	34	9
„ 3...	17	0	20	0	23	0	26	0	29	0	32	0	36	0	48	0
„ 4...	18	3	20	9	23	3	25	9	28	3	30	9	35	9	40	9
„ 5...	21	6	24	0	27	3	30	0	33	0	30	0	42	0	48	0
„ 6...	30	0	33	0	37	6	43	6	46	0	50	0	60	0	66	0

AXES.

	per lb.
Kent, Newcastle, Yorkshire, Suffolk, or Scotch patterns...	6½*d.*
Ditto ditto ditto ditto steel, polished...	8½
Ditto ditto ditto ditto ditto best...	9½
Wheeler's axe..	10½

(JOINER'S) BENCH CRAMP.

Square Thread.

Thickness of screws...	1	1⅜	1⅝	2	inches.
	s. *d.*	*s.* *d.*	*s.* *d.*	*s.* *d.*	
	2 4	1 8	1 2	0 10	per lb.

Joiner's cramp	4	5	6	7	8	feet.
	s.	*s.*	*s.*	*s.*	*s.*	
	32	35	42	50	60	each.

Sash cramp	18	21	28	32	36	inches.
	s.	*s.*	*s.*	*s.*	*s.*	
	16	21	26	32	38	per pair.

BENCH VICE.

Up to 4 lbs., 6*s.* each; above 4 lbs., 1*s.* 3*d.* per lb.
Best black staple vice, per lb., 6*d.*

BELLOWS-FORGE.

Inches Across.

16	18	20	22	24	26	28	30	32	34	36	38	40	42
s.	*s.*	*s.*	*s.*	*s.*	*s.*	*s.*	*s.*	*s.*	*s.*	*s.*	*s.*	*s.*	*s.*
24	29	34	41	49	59	69	81	100	124	159	200	247	300

BELLOWS-FORGE—*continued.*

Circular Double Blast Bellows.

Inches Diameter.

18	20	22	24	26	28	30	32	34	36
s.	*s.*	*s.*	*s.*	*s.*	*s.*	*s.*	*s.*	*s.*	*s.*
108	118	139	159	178	208	242	270	315	350

BILL-HOOKS, per dozen.

	1.		2.		3.		4.	
	s.	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*
Yorkshire socket bills	28	6	31	0	34	0	37	0
Ditto strapped	40	0	42	0	46	0	50	0
Norfolk and Suffolk, single edge	23	0	24	0	26	0	27	0
Nottingham tanged bills	26	0	29	0	32	0	34	0

Strapped double hand switch hooks, 12 inches, per dozen, 44*s.*

BLOWERS

(Silent Fan) with Steam Engines.

Diameter of cylinder.	Diameter of fan-impeller.	Smith's fires blown.	Cwts. melted per hour.	£
4	19	9	18	45
5	22	12	23	55
6	25	16	34	65
7	30	25	55	72
8	36	40	68	95
9	42	60	100	115
10	48	90	135	135

Silent Fans with or without Steam Engines.

Diameter of fan-impeller.	Smith's fires blown.	Cwts. melted per hour.	H.P.	Revolutions per minute.	Without engine.		With engine.
Inches.					£	*s.*	£
16	6	10	1	2000	6	6	39
19	9	20	2·5	1900	8	8	46
22	12	25	3	1800	11	5	54
25	16	35	4·5	1700	16	0	67
30	25	60	6	1600	18	10	72
36	40	70	7	1500	25	0	97
42	60	100	9	1300	30	0	115
48	90	140	11	1100	36	0	130

BRACES

With bits complete.

Best braces .... 9*s*. each.

With	12	18	24	30	36	42	48	54	60 bits.
	s. d.	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*
Cast steel black bits	13 8	16 0	18 0	20 11	23 9	26 0	28 0	31 8	35 2
Ditto, bright........ ..	14 7	17 2	20 2	23 2	26 6	29 3	32 4	35 9	39 9
Ditto, straw colour..	15 3	18 4	21 6	24 10	28 6	31 7	35 0	38 6	43 0

Improved plated braces, 13*s*. each; with brass neck head, 15*s*.

BOILERS.

Cornish or single tube boiler, with or without fittings, made from best Staffordshire plates and Low Moor iron, proved to double the working steam pressure, fittings include water gauge, gauge cock, blow-off cock, mud holes, safety valves, man-hole, furnace door, damper, and pressure gauge.

Horse Power.	Without fittings.	With fittings.	Horse Power.	Without fittings.	With fittings.
	£	£		£	£
4	33	54	20	115	142
8	48	70	25	141	171
10	60	82	30	163	200
14	72	96	40	210	250
16	90	115	50	240	285

Multitubular boilers, with and without fittings, manufactured from the best Staffordshire plates and Low Moor iron, proved to double the working steam-pressure; without fittings, includes only fire and smoke boxes; with fittings, includes furnace door and bars, ash pan, iron chimney, safety valve, spring balance, water gauge, gauge cock, pressure gauge, and blow-off cock.

Horse Power.	Without fittings.	With fittings.	Horse Power.	Without fittings.	With fittings.
	£	£		£	£
2	38	54	14	111	134
4	55	74	16	123	147
6	66	86	18	134	159
8	79	101	20	147	172
10	90	112	25	186	213
12	100	123			

BOILER BEAR,

With beds and punches for ½ ... ⅝ ... ¾ inches £5

BLOCK—*See Pulley.*

CALLIPERS, per dozen.

Up to	6	7	8	9	10	11	12 inches.
	s.	*s.*	*s.*	*s.*	*s.*	*s.*	*s.*
Plain bright steel...	25	30	35	40	45	60	80
Engineer's improved	36	42	48	54	60	72	90
Wing callipers	25	28	31	35	48	46	55
Do., with legs for inside measure ...	31	42	54	63	72	84	100
Spring callipers ...	36	42	48	58	68	78	90
COMPASSES, per doz.							
Plain compasses ...	15	17	20	22	24	27	30
Wing ditto	20	22	24	26	29	36	43
Rack wing ditto ...	24	26	29	31	34	40	48
Spring dividers ...	30	36	42	52	62	72	82

CARPENTER'S AND JOINER'S

Mallets per dozen .... 20*s.*

CHAINS.

Best short linked crane chains.

¼	5/16	⅜	7/16	½	9/16	⅝	¾	⅞	1	inch.
s.	*s.*	*s.*	*s.*	*s.*	*s.* *d.*	*s.* *d.*	*s.*	*s.*	*s.* *d.*	
26	24	22	19	18	17 3	16 9	16	16	15 6	per cwt.

	s.	*d.*	
Waggon coupling chains	18	0	per cwt.
Traces and tip chains	28	0	„

CHISELS, per dozen.

Inches.

		½		¾		1	
		s.	d.	s.	d.	s.	d.
1.	Cast steel firmer chisels	4	6	5	6	7	0
2.	Ditto, handled	7	0	8	0	9	6
3.	Cast steel improved firmer	8	0	9	0	10	6
4.	Ditto, strong	6	6	7	6	9	6
5.	Common short firmer	3	9	4	3	5	0
6.	Strong ditto	5	0	5	6	6	6
7.	Long ditto	5	0	5	9	7	0
8.	Cast steel firmer gouges	5	6	6	6	8	0
9.	Ditto, handled	8	0	9	0	10	6
10.	Improved firmer	8	0	9	6	11	0
11.	Strong ditto	7	0	8	6	10	6

Inches.

	1½		2		2½		3		3½		3¾	
	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.
1.	12	0	18	0	26	6	42	6	59	0	68	0
2.	15	0	21	6								
3.	17	0	24	0	34	0						
4.	17	0	24	6								
5.	9	6	12	9	17	6						
6.	10	6	14	3	22	0						
7.	11	0	14	9	22	6						
8.	14	0	22	0	31	6						
9.	17	0	26	0								
10.	18	0	27	0	39	6						
11.	18	9	30	0								

Inches.

	¼		½		¾		⅞		1	
	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.
Mortice chisels	6	9	10	6	15	6	20	6	25	9
Best joiner's do. gauged	12	0	16	0	26	0	35	0	43	6
Cast steel ditto ditto	14	0	18	0	27	0	36	0	44	0
Sash mortice chisels	—		22	0						
Socket ditto ditto	10	9	15	0	22	6	29	0	37	0
Cast steel socket ditto	15	0	18	9	28	0	37	0	45	0

CHISELS, per dozen—*continued.*

	Inches.				
	½	¾	1	1¼	1½
	s. d.	*s. d.*	*s. d.*	*s. d.*	*s. d.*
1. German steel socket chisels..................	8 0 ...	9 0 ...	10 6 ...	11 9 ...	13 0
2. Ditto ditto, gouges..	9 6 ...	10 6 ...	12 0 ...	13 3 ...	14 9
3. Ditto stalking chisels	12 0 ...	13 9 ...	16 3 ...	18 6 ...	20 9
4. Blockmaker's chisels	18 0 ...	22 0 ...	26 0 ...	30 0 ...	34 0
5. Ditto, gouges	24 0 ...	26 6 ...	30 0 ...	35 0 ...	39 0

	Inches.		
	½	¾	1
	s. d.	*s. d.*	*s. d.*
1. Cast steel millwright's chisels*......................	10 0	13 9	18 3
2. Ditto, ten inches long......	14 6	17 0	22 3
3. Ditto, twelve inches long...	16 6	20 6	27 0
4. Cast steel turning chisels...	6 9	8 6	10 9
5. Ditto, turning gouges......	8 0	11 0	14 3
6. Ditto, long strong turning chisels	9 6	12 0	16 0
7. Do. do. do. do. gouges......	17 0	22 0	28 0
8. Ditto, thick backs, ditto...	15 6		

	Inches.							
	1¼	1½	1¾	2	2¼	2½	2¾	3
	s. d.	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*
1.	24 0	28 6	33 6	41 6	50 0	62 0	74 0	82 0
2.	26 0	31 0	36 0	42 0				
3.	30 0	36 0	40 0	52 0				
4.	14 0	17 6	20 6	25 6	32 6	40 0		
5.	19 0	24 6	29 6	36 0	41 0	50 0		
6.	20 0	26 0	33 0	40 0				
7.	34 0	42 0	48 0	52 0				

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* Cast steel millwright's gouges, 4*s.* to 1 inch ; 5*s.* to 1½ inch ; and all above 1½ inch, 7*s.* per dozen extra. Engineer's chisels, 10*d.* per lb. Mill chisel and mill pick, 1*s.* per lb.

CIRCULAR SAWS and Benches.

Saw benches, planed metal top, metal standards, bright saw spindle, running in brasses, fast and loose pulleys, collars, and parallel gauge complete:

	Size of table.	£	s.	d.
To take in a 12-inch saw	3ft. × 1ft. 9	12	10	0
„ 18 ditto	4 × 2 3	16	0	0
„ 30 ditto	5 × 2 6	21	10	0
„ 42 ditto	6 × 3	27	0	0
Small table for 12-inch saw on standards, table to raise or lower, parallel gauge		11	0	0
Parallel gauge for large tables		6	0	0

Cast steel grooving saws; teeth sawn out, and saw turned thinner to centre	$\frac{3}{16}$	$\frac{1}{4}$	$\frac{5}{16}$	$\frac{3}{8}$	$\frac{7}{16}$	inch in thickness.
	s. d.	s. d.	s. d.	s. d.	s. d.	
	1 6	1 7	1 8	1 10	2 0	per inch diameter.
	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{7}{8}$	1	inch in thickness.
	s. d.	s. d.	s. d.	s. d.	s. d.	
	2 2	2 3	2 6	3 0	3 3	per inch diameter.

Saw spindles in pedestals and brasses, fast and loose pulleys	1	1¼	1½	1¾	2	inch diameter.
	s.	s.	s.	s.	s.	
	38	49	63	77	90	each.
	2¼	2½	2¾	3		inch diameter.
	s.	s.	s.	s.		
	105	125	150	180		each.

CLAWS:

Strong black claw wrench, 10*s.*; bright, 14*s.*

CRABS

(Hoisting) and Lifting Jacks.

Single purchase hoisting crab, to lift	2 tons.	4 tons.	6 tons.	8 tons.	20*s.* extra with break
	£ s.	£ s.	£ s.	£ s.	
	6 6	7 10	8 5	9 5	

Double purchase hoisting crab, to lift	4 tons.	6 tons.	8 tons.	12 tons.	30*s.* extra with break.
	£ s.	£ s.	£ s.	£ s.	
	8 0	10 10	13 0	17 0	

CRABS—*continued.*

Lifting or Screw Jacks:

Height with screw down	14	16	18	21	inch.
Diameter of screw	1⅝	1¾	2	2¼	inch.
To lift	2	3	4	6	tons.
	s.	*s.*	*s.*	*s.*	
1. Bottle jack, wrought iron case	45	55	67	85	
2. Ditto, strong cast iron ditto	33	40	52	68	
3. Tripod jack, solid brass tops	50	59	73	86	
4. Bottle jack, strong cast case with lever	53	60	72	96	
5. Tripod jack, solid brass top, with lever	70	79	98	114	
6. Haley's patent lifting jack	90	95	105	115	

Height with screw down	24	27	30	33	36	inch.
Diameter of screw	2½	2¾	3	3¼	3½	inch.
To lift	8	10	12	16	20	tons.
	s.	*s.*	*s.*	*s.*	*s.*	
1.	100	122	150	200	250	
2.	83	100	125	160	195	
3.	105	125	155	200	250	
4.	118	135	170	205	245	
5.	140	160	190	245	295	
6.	140	160	180	240	280	

	Height when down, inch.	Will traverse, inches.	Will lift, tons.	£	*s.*	*d.*
Lifting and traversing screw jacks, with double ratchet lever to main screw	20	6½	5	9	10	0
	26	12	10	11	13	0
	27	16	15	16	0	0
	27	22	20	18	0	0
Ratchet screws, jacks, &c.	21	...	5	5	15	0
	24	...	7	6	3	0
	27	...	10	7	5	0
	30	...	12	8	10	0
Hydraulic jack, made of best wrought iron and steel, with gun-metal pump	26	...	10	20	0	0
	28	...	15	23	0	0
	30	...	20	28	0	0
	32	...	30	34	0	0

CRANES

For Railways, Wharves, Dockyards, &c.; Oak Jib; double geared.

	Ton.	Radius.	Height.	£
To lift	1	9 feet	10½ feet	40
,,	1½	9½ ,,	10½ ,,	47
,,	3	13 ,,	14 ,,	80
,,	5	16 ,,	16 ,,	112
,,	8	17 ,,	17 ,,	133
,,	10	18½ ,,	18½ ,,	175
,,	13	18½ ,,	18½ ,,	225

DIVING APPARATUS.

	£	s.	d.
Treble barrel atmospheric air engines, in strong wood chest, with handles, fly wheel, and 2 crank handles; 2 iron caps to protect the cranks; 6 spanners to fit all the screws; 1 till containing 3 gun metal plain joints, 1 spare union joint (as on air tube), 1 spare gun metal crank nut, 4 spare helmet collar nuts, 3 spare sets of bucket bathers, valve springs, washers, &c.	70	0	0
Strong wicker basket, containing 1 tinned copper diving helmet, with jointed screw, collar, and mountings, 2 lead weights with gun metal mountings adjusted to helmet, 1 helmet cushion, 110 feet vulcanized India-rubber tube, with galvanized spiral wire inside and braided twist outside, with gun metal union joints	45	0	0
One strong chest, containing 2 waterproof diving dresses, with vulcanized India-rubber collar and cuffs, 1 pair boots with lead soles, 4 pair yarn hose, 2 pair ditto outside, 4 pair drawers, 6 white Guernsey frocks, 2 pair duck overalls, 2 caps, 12 wrist rings, 2 twilled neckerchiefs, 30 fathom ladder line, 30 fathom signal line, 1 can India-rubber solution, 2 yards prepared canvas, knife and shot belt	27	0	0

DRILLING MACHINES.

Pillar drilling machine, with portable vice bench and tool box	10	0	0

Drilling post, 3*l*. Drilling pillar, 1*l*. 10*s*. Crank brace for ditto, 8*s*.

DRILLING MACHINES—*continued.*

	¼	½	¾	1 in. holes.
Bench drilling machine, with hand fly-wheel to drill	£5.	£6 15*s.*	£9.	£13.
Table and standard			30*s.* extra.	

	£	*s.*	*d.*
Drilling machine, with cone pulleys and counter shaft, fast and loose pulleys, hangers and brasses, and metal stand	22	0	0
Double geared drilling machine, 12 in. to centre, adjustable table by rack and worm, self-acting feed motion	40	0	0
Ditto, with compound slide table	48	0	0
Ditto, single geared, 13½ in. to centre, beeched, hand-feed motion, with 12 in. in traverse circular motion, 22 in. diameter, planed base plate, top gear, &c.	28	0	0
Double geared drilling machine, 15 in. to centre, table swinging on metal column, fitted with rack-elevating motion, self-acting or hand-feed motion	55	0	0
Ditto, 18 in. to centre, feed motion of three speeds, table to rise and fall, planed base plate fitted with slots, top gear, screw keys, &c.	63	0	0

ENGINES.

Direct-acting horizontal steam engines, of best material and make, including governor (or, if required for mining or reversing, proper reversing gear), feed pump, fly wheel, and regulating valves complete to the end of fly-wheel shaft:—

Horse power.	£	Horse power.	£
4	78	40	430
6	104	50	510
8	122	60	600
10	153	70	700
14	216	80	800
20	270	90	900
25	333	100	1000
30	255		

Vertical steam engines, of best make and materials. Boiler of best Staffordshire plates and Low Moor iron fire boxes; boilers jacketed with felt and wood lagging; supplied with governors, safety valve, spring balance, pressure gauge, glass

ENGINES—*continued.*

water gauge, gauge cocks, blow-off cocks, fly wheel, iron chimney with hinge, &c., all complete:—

Horse power.	£	Horse power.	£
2	117	8	200
3	120	10	245
4	140	12	280
6	180	15	330

Portable steam engines, manufactured as above. Boilers of best Staffordshire plates and Low Moor iron fire boxes; boilers jacketed throughout with felt and wood lagging; fitted with iron chimney to lower down, fly wheel, governor, safety valve, water gauge, gauge cocks, pressure gauge, blow-off cock, mud holes, force pumps, &c., all complete, on wood or iron wheels:—

Horse power.	£	Horse power.		£
4	175	10		275
5	190	12		315
6	205	15	double cylin.	380
7	225	18	„ „	450
8	240	20	„ „	495

Gwynne's combined gas exhauster, or blower, for blowing furnaces, cupolas, &c., exhausting and ventilating mines, manufactories, &c., or exhausting gas:—

	£	With steam engine complete.
To discharge up to 2,000 cub. ft. per hour	28	75
„ „ „ 5,000 „ „	36	95
„ „ „ 10,000 „ „	45	125
„ „ „ 15,000 „ „	56	145
„ „ „ 20,000 „ „	69	170
„ „ „ 30,000 „ „	110	230
„ „ „ 40,000 „ „	145	280
„ „ „ 50,000 „ „	169	315
„ „ „ 60,000 „ „	205	365

Engineers' turning tools, 6*s.* per dozen. Cast steel screw tools, 20*s.* per dozen pair; long cast steel screw tools, 22*s.* per dozen.

FILES.

Flat, entering, mill saw, 4 square (8½ inch and upwards) Cotter taper points:—

	5	6	7	8	9	10	inches
	s. d.	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	
1. Rough and bastard ...	4 8	5 6	6 8	8 0	9 9	11 9	per doz.
2. Second cut	5 4	6 2	7 6	9 6	11 6	13 9	„
3. Smooth*...	6 2	7 6	9 2	10 10	12 6	14 9	„

Round, half round, 3 square, 4 square to 8½ inch; flat with one round edge, and double cut mill saw files:—

4. Rough and bastard	5 0	6 0	7 0	8 6	10 6	12 6	per doz.
5. Second cut .	6 0	7 0	8 6	10 6	12 6	14 6	„
6. Smooth* ...	6 9	8 0	9 6	11 6	13 6	16 0	„

Pin files:—

7. Rough and bastard	—	9 9	11 9	13 9	16 0	19 0	per doz.
8. Second cut .	—	11 6	13 9	16 6	20 0	24 0	„
9. Smooth* ...	—	12 6	14 9	17 6	21 0	26 0	„

Hand, pillar, needle, round off, bone files, pottance, stopping and flat, with two round edges:—

10. Rough and bastard	5 0	6 8	8 0	9 9	12 0	14 0	per doz.
11. Second cut	6 0	7 6	9 6	11 6	14 0	16 6	„
12. Smooth* .	7 0	9 2	10 10	12 6	15 0	17 6	„

Double-tanged and blunt mill saw, equalling, cant, cross, slotting, tumbler, rifler, arch, lock, and parallel cotter:—

13. Rough and bastard	6 8	8 0	10 0	11 9	13 9	16 6	per doz.
14. Second cut	7 6	10 0	11 6	13 9	16 6	20 0	„
15. Smooth* .	9 2	11 0	12 6	14 9	17 6	21 0	„

---

* All dead smooth files double the price of smooth.

FILES—*continued.*

	12	14	16	18	20	22	24	inches
	s. d.	*s.*	*s.*	*s.*	*s.*	*s.*	*s.*	per doz.
1.	16 6	23	34	48	64	83	105	,,
2.	20 0	28	40	57	78	98	117	,,
3.	21 0	30	44	64	86	107	130	,,
4.	18 6	26	38	52	68	—	—	,,
5.	22 0	30	43	60	81	—	—	,,
6.	24 6	34	48	66	92	—	—	,,
7.	28 0	41	55	72	94	—	—	,,
8.	34 0	47	67	87	105	—	—	,,
9.	36 0	54	74	96	118	—	—	,,
10.	19 6	28	41	55	72	94	117	,,
11.	24 0	34	47	67	87	106	128	,,
12.	26 0	36	54	74	96	119	141	,,
13.	23 0	34	48	63	84	106	—	,,
14.	28 0	40	57	77	99	117	—	,,
15.	30 0	45	64	85	108	130	—	,,

Files and Rasps.

	12	15	18	20	22	24	inches
	s. d.	*s.*	*s.*	*s.*	*s.*	*s.*	
Cabinet rasps	24 0	40	68	92	116	142	per doz.
Double-horse do.	18 6	32	52	—	—	—	,,
Tanged-horse do.	28 6	48	74	—	—	—	,,
Flat do.	18 6	33	53	68	90	120	,,
Gunstocker do.	20 0	34	57	—	—	—	,,
Half-round do.	22 0	36	60	82	105	130	,,
Round (rat-tail) do.	22 0	36	60	82	105	130	,,

GIMLETS.

	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{5}{8}$	inch.
	s. d.	*s. d.*	*s. d.*	*s.*	
Cast steel, shell spike	6 0	8 0	11 0	16	per doz.
Do., do., with box heads	8 6	10 6	14 6	20	,,
Do., patent spike, do.	11 6	14 0	19 6	26	,,
Do., ship gimlets, eyed	12 0	14 0	16 0	20	,,
Do., wheeler's gimlets	5 0	7 0	10 0	16	,,

GAUGES.

	Per doz. s.		Per doz. s.
Beechwood marking	8	Beechwood cutting gauge, plated	13
Ditto, plated	11	Hardwood cutting ditto	18
Ditto, head brass face	18	Ditto, brass hooped	24
Ditto, head and stem ditto	35	Ditto, head faced with brass	33
Hardwood marking	16	Best mortice gauge, brass slide, plated	40
Mortice gauge, brass slide	28	Ditto, head brass faced	48
Best ditto	34		
Beechwood cutting gauge	11		

HAMMERS.

	Per dozen. s.	s.		Per dozen. s.	d.	s.
Brick from	12	to 48	Double-face hammers from	10	0	to 18
Bricklayer's laying from	20	to 24	Best claw hammers from	8	6	to 24
Lath „	12	to 24	Exeter pattern, „	5	6	to 24
Glazier's „	18	to 21	Rivetting hammers from	4	6	to 23
Plumber's „	13	to 17	Warrington heads from	10	6	to 28
Slater's pick with claw from	30	to 36				

LATHES.

Foot lathe, fitted with turned speed wheel, chain to connect crank, and antifriction treadle, rest stock, fan plate, catch plate, drill chuck, centres for iron and wood rests, and spanners :—

Length of planed metal bed	3	4	5	6	feet.
Height of centres	4	5	5½	6	inches
	£	£	£	£	
	12	16	20	24	each.
Double geared	—	20	—	30	„

Lathe: double geared hand lathe, with catch and face plates, excentric holder and top driving apparatus, and socket rest :—

Height of centre	6	7	8	9		inches
Length of bed	6	7	8	9		feet.
Length between centres	3½	4½	5	5½		„
	£	£	£	£	s.	
1. Single speed headstocks	8	9	10	12	0	each.
2. Double power gear ditto	15	16	25	26	10	„

LATHES—*continued.*

	s.	*s.*	*s.*	*s.*	*d.*	
3. Best planed to fit ditto, and fitted with standards	20	25	30	35	0	per ft.
4. Top driving apparatus...	50	60	70	80	0	each.
	£	£	£	£	*s.*	
5. Compound slide rests...	6	7	8	9	0	,,

Height of centres		10	11	12	13	14	15	16	18	20	in.
Length of bed ...		10	11	12	13	14	16	18	21	24	feet.
Length between centres		6	7	8	9	10	11½	13	15	17	,,
		£	£	£	£	£	£	£	£	£	
	1.	14	16	18	20	22	24	31	41	51	each.
For reference to numbers see above.	2.	30	33	40	44	50	60	70	80	100	,,
		s.	*s.*	*s.*	*s.*	*s.*	*s.*	*s.*	*s.*	*s.*	
	3.	40	45	50	55	60	70	80	90	100	pr.ft.
	4.	95	105	115	125	135	145	155	165	180	each.
		£	£	£	£	£	£	£	£	£	
	5.	10	11	12	13	14	16	18	22	26	,,

Cup chucks, 7*s.* per inch diameter; four screw chucks, 10*s.* per inch diameter; three jaw universal chucks, 13*s.* per inch diameter.

Lathe: self acting slide lathe, double power head gear stocks, change speed wheels, top driving apparatus, adjustable back stay, &c.:—

Height of centre	6	7	8	9	10	inches.
Length of bed	6	7	8	9	10	feet.
Length between centre ...	3½	4½	5	5½	6	inches.
	£	£	£	£	£	
1.	45	55	75	85	100	each.
2. Leading screw and change wheels extra when required for screw cutting	7	8	10	12	14	,,
	s.	*s.*	*s.*	*s.*	*s.*	
3. Longer bed, per foot ...	20	25	30	35	45	

Height of centres.........	11	12	13	14	15	16	18	20	in.
Length of bed............	11	12	13	14	16	18	21	24	feet.
Length between centres	7	8	9	10	11½	13	15	17	,,
	£	£	£	£	£	£	£	£	
1.	110	130	140	160	170	200	250	290	each.
2.	16	18	20	22	24	26	31	36	,,
	s.	*s.*	*s.*	*s.*	*s.*	*s.*	*s.*	*s.*	
3.	50	60	65	70	80	90	105	120	,,

PICKS.

	s.	
Pick, 5 to 9 lbs. ...	36	per cwt.
Pickaxe, 4 to 10 lbs.	36	„
Brazil pickaxe......	36	„

	s.	*d.*	
Stone pick.........	36	0	per cwt.
Stone dresser's hammer & pick	0	7	per lb.
Morticing axe ...	0	7	„

PLANES.

Bench Planes.

	1st class London. *s.*	*d*
2 in. smoothing plane...	3	9
2¼ ditto ditto ...	4	0
2½ ditto ditto ...	4	3
2 in. jack plane to 17 in.	5	0
2¼ ditto ditto	5	6
Pannel ditto..............	6	0
Ditto slipped..............	6	9
Jointer plane, 28 inches	8	0
Ditto 30 ditto	9	0
Trying plane, 22 ditto	6	9
Ditto, 24 ditto	7	0
Long ditto, 26 ditto	7	6
Grooving plane, slit deal ⅜″ to ¾″	6	6
Ditto, ditto 1 inch	7	2
Ditto, ditto moving fence with 3 pairs of irons...	12	6
Ditto, large as jack plane, with 1 pair of irons...	15	0

	1st class London. *s.*	*d.*
Compass plane, smooth 2 inches	4	6
Ditto, box top	6	6
Straight block, 2¼ inches	4	9
Smooth raising............	7	6
Ditto, badger mouth......	8	6
Jack ditto..................	10	0
Badger plane..............	10	6
Ditto, 2 fences............	12	6
Plated smooth, 2 inches...	7	6
Hollow and round, joiner's set of 8 pair	84	0
Handrail, set of 3 best...	16	0
Ditto, ditto, circular......	30	0
Ploughs for circular and straight work, 12 irons, 2 stops, 2 pair plates, ivory gauge stem, and irons gauged............	53	0

PLANING MACHINE—Self-acting.

Plane in length. ft.	in.	Plane in width. ft.	in.	Admit depth. ft.	in.	£
1	6	1	1	1	0	31
2	0	1	6	1	6	44
4	0	1	6	1	6	51
5	0	2	0	2	0	80
6	0	2	6	2	6	105
6	6	3	0	3	0	125

Plate-layer's Tools.

Adze, 10*s.* 6*d.* each; keying hammer, 6*d.* per lb.; solid cast steel, 1*s.* 3*d.* per lb.

Auger	⅜	½	⅝	¾	⅞	1	1⅛	1¼	1⅜	1½ inches
	s.	*s.*	*s.*	*s.*	*s.*	*s.*	*s.*	*s.*	*s.*	*s.*
	20,	21	24	27	30	33	37	44	47	50 per doz.

Clip jack, 5*l.* each; permanent way cramp, 7*d.* per lb.; fish joint spanner and holder, 6*d.* per lb.

Ratchet spanner, 26*s.* each; spiking hammer, 4*s.* 6*d.*; sledge hammer, 5*s.*

Crank brace, 9*s.* each; spirit level, 1*s.* per inch; wood maul, hooped, 8*s.*

	s.	*d.*	
Screw coupling	0	6	per lb.
Rail gauge	0	4½	,,
Travelling ditto, with turned ends	0	5	,,
Crowbar, with steel claw	0	4	,,
Pin cutter	0	5	,,
Cramp drill	30	0	each
Cast-steel drift pin	1	0	per lb.
Cast-steel punch	1	0	,,
Ditto, sate	1	0	,,
Wood straight edge or level	4	6	each
Gravel shovels, round nose, 15 inches × 12 inches	34	0	per doz.
Plate-layer's beating pick	36	0	per cwt.

	9	10	12 feet
	s.	*s.*	*s.*
Strong wood lever, with iron shoe	22	25	30 each

Punching and Shearing Machines.

	£
Punching machine, suitable for ½ inch holes in ½ inch plates, and to shear the same 6½ inches from the edge, in complete working order	30
Ditto, for ⅝ inch holes in ½ inch plates, to shear ditto, ditto	33
Ditto, for ¾ inch holes in ⅝ inch plates, and shear 10 inches from the edge	47
Ditto for 1 inch holes in ¾ inch plates, and shear 16 inches from the edge	65

Pulley Blocks.

Diam. of sheaves	3	4	5	6	7	8 inches
	s.	*s.*	*s.*	*s.*	*s.*	*s.*
With 1 sheave	8	12	24	36	45	55 each
„ 2 ditto	12	18	28	45	65	80 „
„ 3 ditto	15	23	38	55	75	90 „
„ 4 ditto	20	35	45	75	90	120 „

Saws.

Iron web for cutting iron or brass.

8	9	10	11	12	13	14	15 inches
s.	*s.*	*s.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*
10	11	12	12 6	13 6	14 6	15 6	16 6 per doz.

Mill-saw web, for timber, and deal mill-saw frames.

	s.		*s. d.*
3 feet 6 in. × 5 in.	11 each	4 feet × 5 in.	13 0 each
3 „ × 3 in.	6 „	4 „ 6 in. × 5 in.	15 0 „
3 „ 6 in. × 3 in.	7 „	5 „ × 5 in.	17 0 „
4 „ × 3 in.	10 „	5 „ 6 in. × 5 in.	18 6 „
3 „ 6 in. × 4 in.	8 „	5 „ 6 in. × 6 in.	20 0 „
4 „ × 4 in.	11 „	6 „ × 6 in.	23 0 „
4 „ 6 in. × 4 in.	12 „	6 „ 6 in. × 6 in.	25 0 „
5 „ × 4 in.	15 „		

Billet or Canada Web.

	30	36	42	45	48	54	60 inches
	s.	*s.*	*s.*	*s.*	*s.*	*s.*	*s.*
Cast steel	36	51	63	76	100	110	135 doz.
German steel	32	47	57	70	90	100	125 „

Mill Saws.

	4½	5	5½	6	6½	7	8 feet
	s.	*s.*	*s.*	*s.*	*s.*	*s.*	*s.*
Cast steel	22	24	26	30	34	38	50 each
German steel	18	20	22	24	27	31	42 „

Cast steel stone saw, not above 9 inches wide.

5	5½	6	6½	7	7½	8 feet.
s.	*s.*	*s.*	*s.*	*s.*	*s.*	*s.*
23	25	27	30	32	36	40 each

SAWS—*continued.*

Saws—Hand, Pannel, Ripping, and Grafting.

	10	12	14	16	18	20	22	24	26	28	30 in.
	s.	*s.*	*s.*	*s.*	*s.*	*s.*	*s.*	*s.*	*s.*	*s.*	*s.*
Warranted spring steel ...							74	83	90	95	106 doz.
Cast steel	26	32	40	46	54	56	62	70	72	80	85 „
German steel	22	26	32	38	44	48	53	59	61	67	73 „

	8	10	12 inches
	s.	*s.*	*s.*
Dovetail saw	68 ...	70 ...	80 dozen

SCREW STOCKS.

Best double-handed, Whitworth's pitch.

				s.	
$\frac{1}{4}$ ...	$\frac{5}{16}$ ...	$\frac{3}{8}$ ...	$\frac{1}{2}$ inch	42	per set
$\frac{5}{16}$ ...	$\frac{3}{8}$ ...	$\frac{1}{2}$ ...	$\frac{5}{8}$ „	48	„
$\frac{3}{8}$ ..	$\frac{1}{2}$ ...	$\frac{5}{8}$ ...	$\frac{3}{4}$ „	52	„
$\frac{9}{16}$ ..	$\frac{5}{8}$ ...	$\frac{3}{4}$ ...	$\frac{7}{8}$ „	56	„
$\frac{5}{8}$ ...	$\frac{3}{4}$ ...	$\frac{7}{8}$ ...	1 „	66	„
$\frac{3}{4}$ ...	$\frac{7}{8}$ ...	1 ...	$1\frac{1}{8}$ „	76	„
$\frac{7}{8}$ ...	1 ...	$1\frac{1}{8}$ ...	$1\frac{1}{4}$ „	90	„
1 ...	$1\frac{1}{8}$ ...	$1\frac{1}{4}$ ...	$1\frac{3}{8}$ „	105	„
$1\frac{1}{8}$ ...	$1\frac{1}{4}$ ...	$1\frac{3}{8}$ ...	$1\frac{1}{2}$ „	135	„

VICES.

Improved vice for planing machine with swivel bottom:—

6	7	8	9	10	12	14	in. jaws.
s.	*s.*	*s.*	*s.*	*s.*	*s.*	*s.*	
135 ...	140 ...	145 ...	150 ...	155 ...	165 ...	175	each.

Portable parallel vices with steel jaws:—

5	6	7	inch jaws.
s.	*s.*	*s.*	
110	130	150	each.

WAGGONS.*

	£
Waggons for earthworks	14
Ditto, side tipping	16
Ditto, ballast	20

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* For working drawings of contractors' waggons see "Railways in the East.' Atchley & Co., 106, Great Russell Street, Bedford Square.

RAILWAY CROSSING.

Fig. 1.

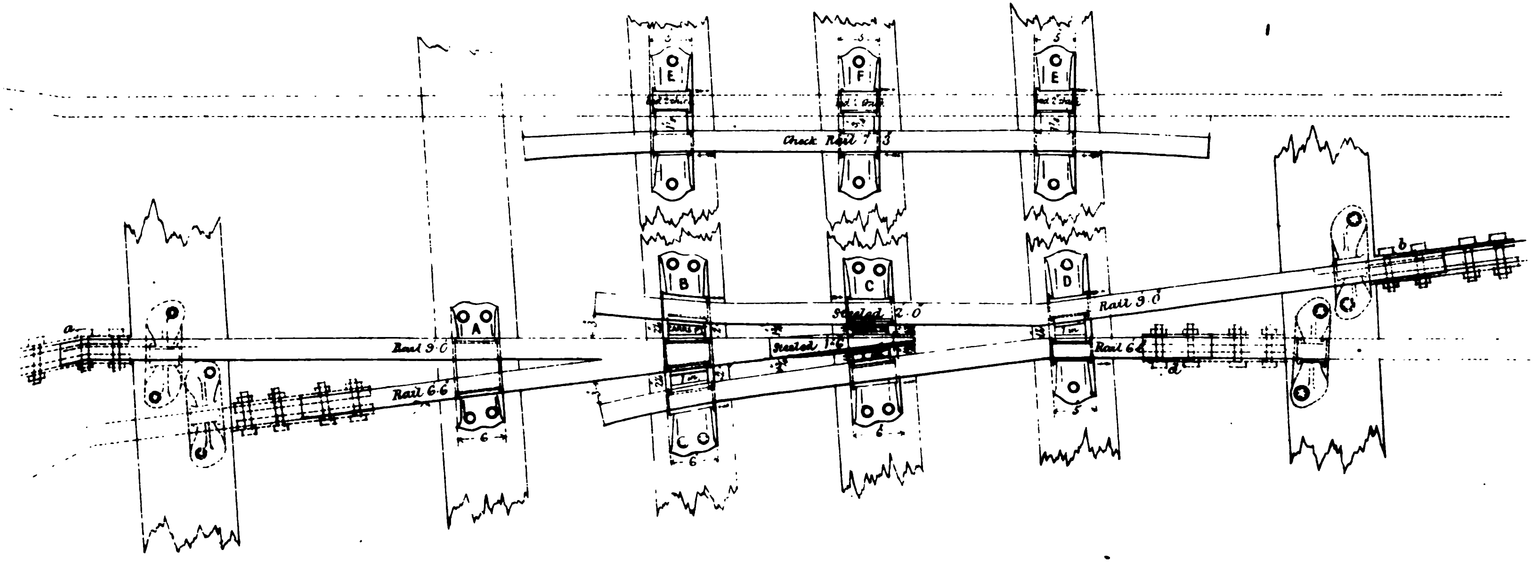
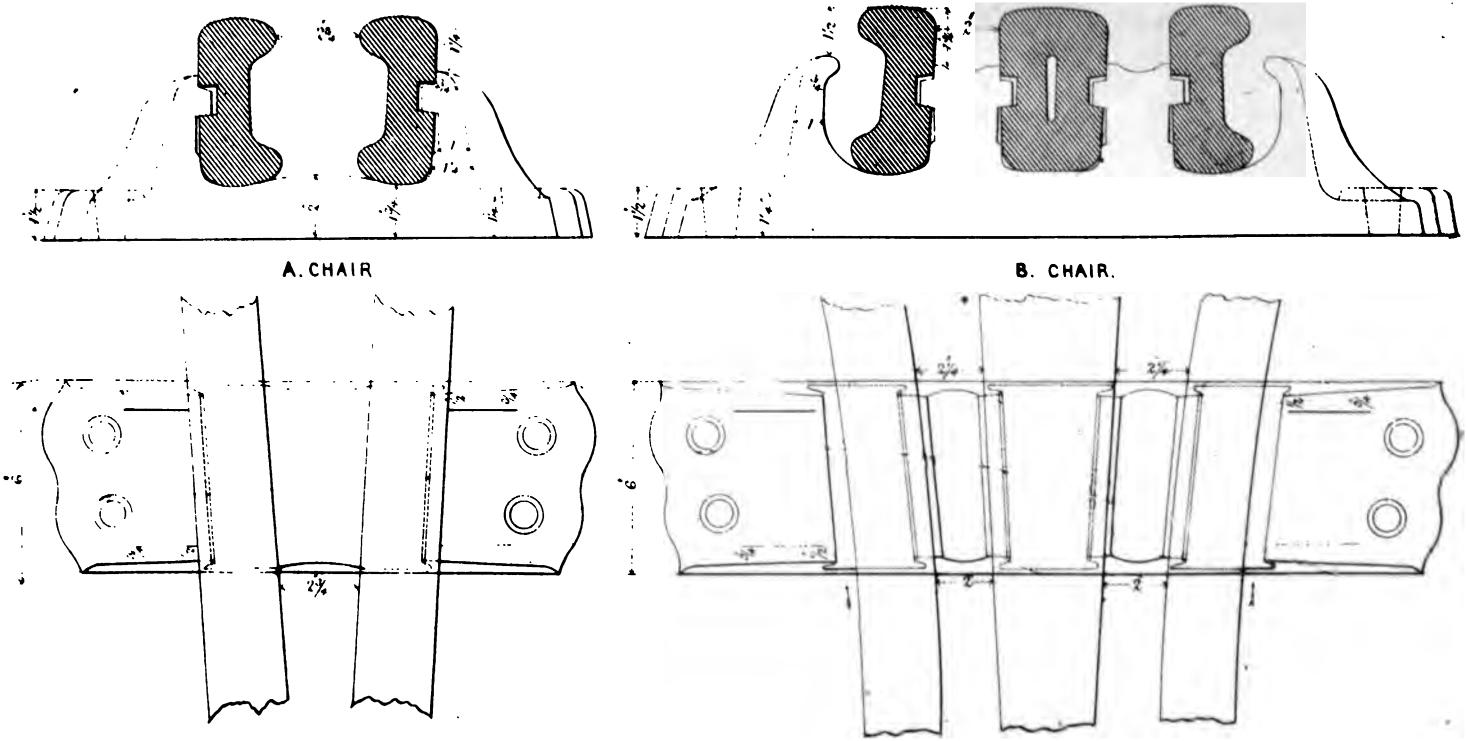


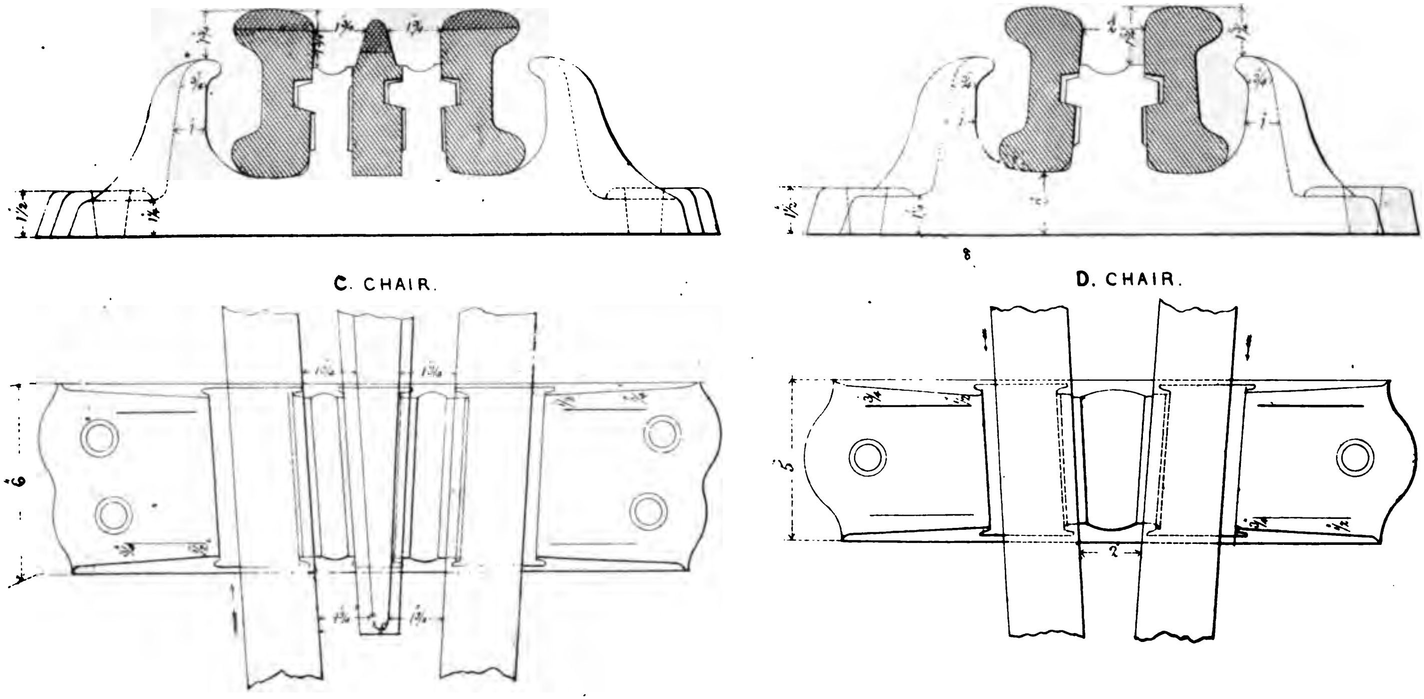
Fig: 2



A. CHAIR

B. CHAIR.

Fig. 3.


C. CHAIR.

D. CHAIR.

LONDON, *January*, 1874.

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Humber's New Work on Water-Supply.

A COMPREHENSIVE TREATISE on the WATER-SUPPLY of CITIES and TOWNS. By WILLIAM HUMBER, Assoc. Inst. C.E., and M. Inst. M.E. Author of "Cast and Wrought Iron Bridge Construction," &c. &c. This work, it is expected, will contain about 50 Double Plates, and upwards of 300 pages of Text. Imp. 4to, half bound in morocco. [*In the press.*

⁂ *In accumulating information for this volume, the Author has been very liberally assisted by several professional friends, who have made this department of engineering their special study. He has thus been in a position to prepare a work which, within the limits of a single volume, will supply the reader with the most complete and reliable information upon all subjects, theoretical and practical, connected with water supply. Through the kindness of Messrs. Anderson, Bateman, Hawksley, Homersham, Baldwin Latham, Lawson, Milne, Quick, Rawlinson, Simpson, and others, several works, constructed and in course of construction, from the designs of these gentlemen, will be fully illustrated and described.*

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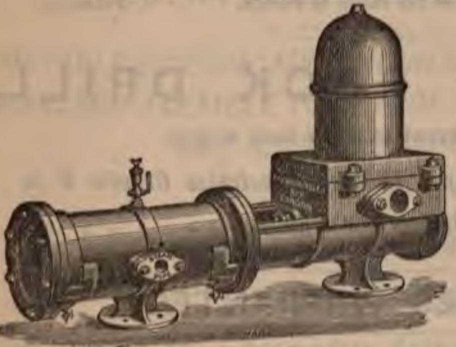

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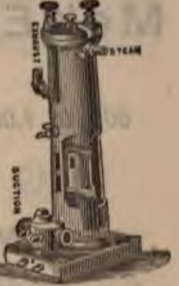

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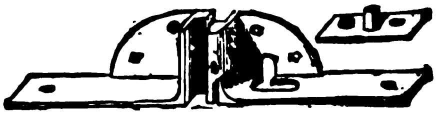

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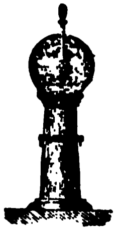

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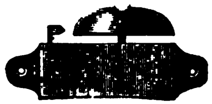

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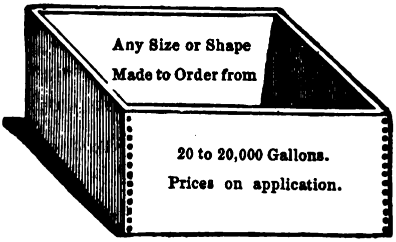

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